

THE IRON AGE

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Continuous Stores Keeping Cuts Investment

System of Checks and Almost Automatic Control of Ordering Materials Economizes in Space Required and in Amount Carried

IN an effort to minimize the amount of stores and repair parts carried in the storehouse, the Erie Forge & Steel Co., Erie, Pa., has developed a system of keeping track of stores under which the amount of any item carried in stock is the smallest amount which could be purchased advantageously at one time, unless a larger amount is required because of rapid use. The

fully marked, so that new as well as old employees may readily find the material wanted, with the least possible delay.

Each bin has a board within it, which effectually and physically separates one portion of its contents from another. This board gives a warning that, when it is reached in the gradual issuing of stores, it is time

The image displays six numbered cards or forms used in the Continuous Stores Keeping system. Card 1 is a 'STORES TAG' for 'Gold Dust Washing Powder' with a quantity of 2 packages. Card 2 is an 'ORDER TAG' for the same material, showing an order number of 3084 and a date due of 4/14. Card 3 is another 'STORES TAG' for 'Gold Dust Washing Powder' with a quantity of 2 packages. Card 4 is a 'STORES TAG' for 'Gold Dust Washing Powder' with a quantity of 2 packages. Card 5 is an 'ORDER PLACED' tag for 'Gold Dust Washing Powder' with a quantity of 2 packages. Card 6 is a 'STORES TAG' for 'Gold Dust Washing Powder' with a quantity of 2 packages.

These Six Cards or Forms Are Described in the Text

whole thing has been worked down to a basis which might be described as almost scientific, with a definite allotment of each size and kind of material as the amount to be carried on hand, and a rigid determination of the point in the consumption of that material where a new order should be put in, so that delivery may be made before the remaining balance of the old stock is consumed.

In the stores building, which, despite this arrangement, carries some \$150,000 worth of material at all times, the bins for different materials are all care-

to order a new stock if they are to be on hand when needed. As soon as this point is reached, the store-room clerk makes out a requisition upon the office to order as promptly as possible a certain specific amount of the material.

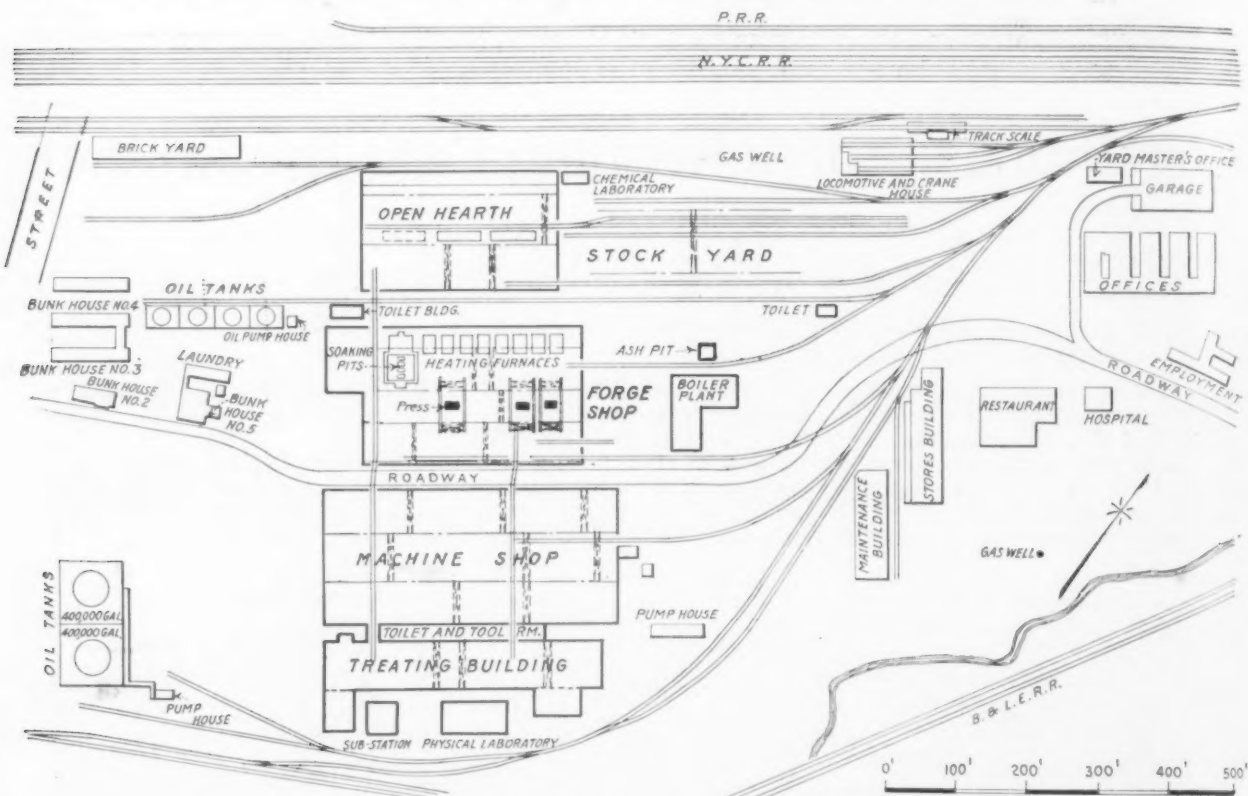
Taking the example shown by the cards herewith illustrated, it will be noted that the so-called "order point" of Gold Dust washing powder is fixed at 20 packages, it having been found by experience that 20 packages will last, in the ordinary run of events, just about the length of time required to get the order

through and the new supply into the bin. This time is shown also, on the card, to be about three weeks. The amount ordered each time is 48 packages, or four cases of 12 packages each. The yellow card, Fig. 2, containing this information, is tacked on the bin where this particular material is kept.

To the new material, when received, a manila tag, Fig. 3, is attached. As the material is unpacked and

certain items, and does not receive it, he immediately goes to the storeroom to learn why. In this way the storeroom clerk is not permitted to overlook sending in his requisition for materials as the several bins become depleted.

Perhaps the best thing that can be said about the system as a whole is that it works, and that the company is much pleased with the way it works.



General Layout of the Plant, Which Was Described on page 1595, THE IRON AGE, June 16

placed in its proper bin, this tag is hung on a hook on the side of the bin, until all of the material covered by the shipment has been issued, when it is stamped to that effect, and sent to the balance clerk in the stores office.

In order that stores may be used up in the order in which they are received, it is customary to remove the small balance of the old material and place this on top of the new, when the new is placed in its bin. Thus no material is allowed to lie in the bin, month after month, without being put into service in its regular rotation. This is important in connection with certain materials which might spoil if left too long.

The white card, Fig. 4, kept by the balance clerk in the stores office, is used as a perpetual inventory of material on hand. All deliveries of materials are entered on one of these cards, and all withdrawals of material also are entered, so that the difference between the two will always represent, barring error, the amount actually on hand. This is subject to check at necessary intervals, but is found so generally reliable in service that it is considered correct at all times.

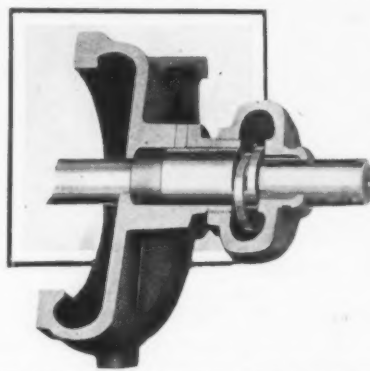
A red card, Fig. 5, is attached to the label on the bin as soon as a requisition is made out for the placing of a new order. This is done primarily as a guide to the clerk in the stores building, so that the order will not be duplicated through lack of his remembering that it has already been placed.

The yellow slip, Fig. 6, and its pink duplicate, serve as requisitions for drawing out materials from stores. This is posted on the balance card when used, and also on the cost records. Extensions of the amount are made by the cost department, and the proper amount charged to the department receiving the material.

By means of this system, both the balance clerk and the storeroom clerk have a ready check upon the condition of the stores in each particular. If the balance clerk finds that an order should come through for

Pump with Ring-Oiled Packing Gland

Centrifugal and other rotary types of pumps which will incorporate a packing gland designed with the ring oiling feature will be manufactured by the Arrow Pump Co., Buhl Building, Detroit.



Packing Gland Incorporating the Ring Oiling Principle. The gland is also used as a bearing to eliminate long overhang

and oil reservoir to permit the use of the ring oiling principle of lubrication. A constant flow of oil is supplied to the gland making it practical to use it also as a bearing, the shaft being supported close up to the load, eliminating overhang and the necessity of out-board bearing. Deflection of the shaft is said to be prevented and the seal of the packing undisturbed. With deflections and vibration of the shaft prevented the metallic packing affords all the resiliency necessary to seal without scoring the shaft.

This method of lubrication is designed to keep a film of oil between the packing and the rotating shaft, and in the bearing. The packing is not subject to the wear it would otherwise have, and is calculated to hold its seal for long periods without adjustment.

It is claimed that the ring oiling feature eliminates leaky glands and scored shafts, increasing the life of the pump by efficient lubrication at the glands.

The illustration shows one example of this construction. The packing gland is arranged in combination with an adjustment nut

British Steel Exports Very Low in June—Imports Relatively Larger

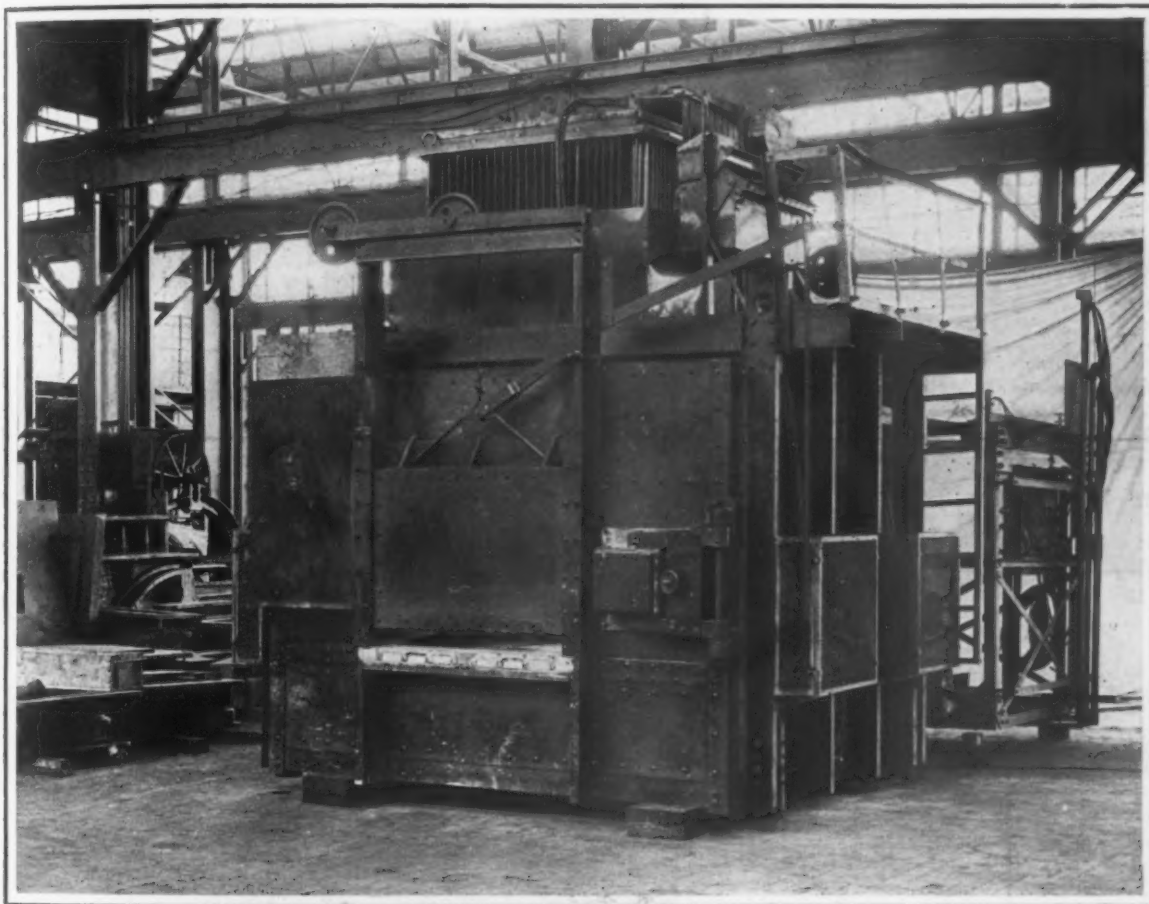
British steel exports in June, this year, excluding iron ore and including scrap, were only 66,301 gross tons as compared with 101,202 tons in May, 161,508 tons in April and 183,373 tons per month for the first quarter. The June exports last year were 287,655 tons. The average per month in 1920 was 274,881 tons per month, while in 1913 it was 420,757 tons per month. The 1919 rate was 188,519 tons per month. The June outgo is therefore much less than even the 1919 monthly average and smaller than any month in the war years. Imports in June were 88,083 tons, which contrast with 89,348 tons in May, 111,536 tons in April, and with 186,040 tons per month in the first quarter.

per month in 1913. The total to July 1 this year was 142,038 tons against 179,066 tons for the same six months last year.

Resistance Type of Electric Furnace Installed for Heating Sheets

In the manufacture of automobile body and fender stampings it is of the highest importance that the heating operations be conducted with as little scaling as possible, for any pitting due to this action requires considerable additional labor in getting the defects sand-blasted to sufficient extent to get a good finish.

The Mullins Body Corporation, Salem, Ohio, with this in mind, recently installed in its new plant a Baily electric furnace specially designed for this work. Since



Baily Electric Resistance Furnace for Heating Sheets Previous to Stamping and Forming

The 1913 imports were 195,264 tons per month and in 1920 they were 128,685 tons per month.

Gross Tons	Exports	Imports
Aver. per mo., first quarter, 1921.....	183,373	186,040
April, 1921.....	161,508	111,536
May, 1921.....	101,202	89,348
June, 1921.....	66,301	88,083
Aver. per mo., second quarter, 1921.....	109,670	96,320
Aver. per mo., 1919.....	188,519	50,801
Aver. per mo., 1920.....	274,881	128,685
Aver. per mo., 1913.....	420,757	195,264

The trend of some of the principal exports is shown by the following data in gross tons:

	Average per Month	June	June
	1913	1920	1921
Pig iron.....	78,771	38,505	43,358
Steel rails.....	41,676	11,213	8,948
Steel plates.....	11,162	16,571	14,882
Galvanized sheets.....	63,506	34,244	45,826
Steel bars.....	20,921	30,322	34,292
Tin plates.....	41,208	29,418	32,756
Black plates.....	5,679	3,026	3,167
Steel sheets.....		11,014	684

Iron ore imports in May were only 34,209 tons, as compared with 541,742 tons per month in 1920. In June, 1920, they were 675,179 tons. The total for the first six months was 1,284,166 tons, as compared with 3,459,508 tons in the first six months in 1920.

Manganese ore imports were 8,334 tons in June against 37,717 tons per month in 1920 and 50,098 tons

a large part of the pressing or drawing to shape is performed cold and only one or two hot runs are required for perhaps six or seven cold operations on the press, it was desirable to build a furnace of the portable type which could be handled by a crane and taken from place to place so that there would be no idle furnaces while the material was receiving its cold runs. This necessitated a furnace with four eye bar connections at the top, one at each corner, for hooking on the crane chains; and also that the transformer and control equipment be located on the top of the furnace, as shown.

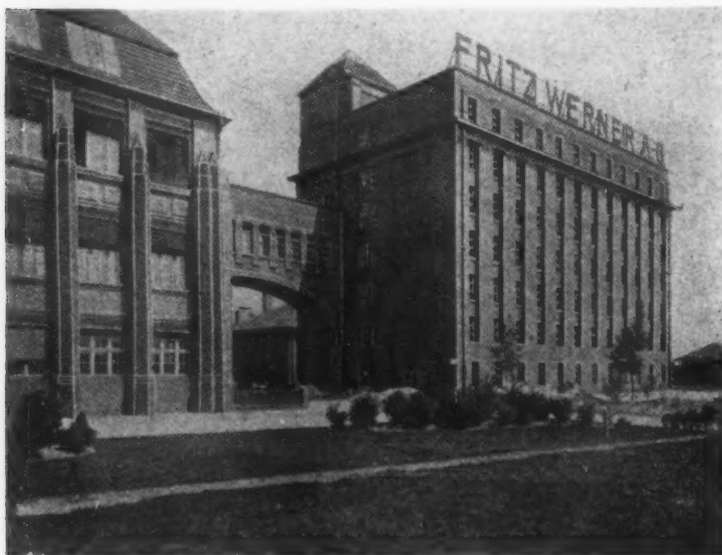
The furnace is rated at 100 k.w. in electrical capacity, and has a hearth 3 ft. 4 in. wide by 6 ft. 5 in. long with a door opening 3 ft. 4 in. wide by 2 ft. 2 in. high. It has a capacity for heating 750 lb. of material to 1800 deg. Fahr. per hr. In plants where a crane is not available for moving the furnace, the equipment is designed for mounting on a car which may be moved at will on a truck running parallel to the presses.

One of the features of this equipment is the remarkable uniformity of temperature obtained on the sheets, a condition which it is claimed is not possible to attain in fuel-fired equipment where the doors must be opened frequently. Scaling is also reduced to an almost negligible item, making very much smoother sheets than is possible in fuel-fired practice.

Features of German Machine Tool Plant

Color of Buildings Considered—Prevailing Winds Aid in Reducing Dust and Noise—Welfare of Apprentices and Workmen Emphasized

A MACHINE tool plant in which important consideration was given to the color of the outside as well as the inside of the buildings, to the prevailing winds as a factor affecting the reduction of dust and noise, and to the welfare of apprentices and workmen, was built for the Fritz Werner Co., Marienfelde near Berlin, Germany. The plant was constructed



Pattern Storage Building, Connected with Engineering Department by an Archway to Permit Study of Patterns on Hand

under war time exigency, but appears to have been able to meet fully post-war economic conditions. At the time the war department called for greater production the plant was located within the city limits of Berlin and expansion was impossible. Accordingly it was decided to use previously acquired property in the suburbs.

The plant occupies about 265,000 sq. ft. The main building, which houses the executive offices and the shops, is located at the southwest corner of the grounds, as this is the shortest route to the nearby railroad station. Advantage was taken of the prevailing west winds in locating the foundry as far as possible from the other buildings, in order to reduce the noise and dust so far as they were concerned.

Traffic is maintained by means of paved streets, standard gage railroad sidings connected with the nearby main line and a system of industrial tracks. The works are divided by a paved main street into a large western area, where the main building is located and a smaller eastern section. In the eastern section are located the pattern storage house, the pattern shop, heat treating shop, boiler house, foundry, foundry material storage shed and garage.

The standard gage tracks consists of two switching and receiving tracks, also a classification track at the northern extremity, which in turn serves four distribution tracks by means of turntables. The outer of the eastern tracks serves to bring materials for the foundry, boiler house and pattern shop; the inner one for raw materials for the machine shops. The two western tracks are used for shipping. Switching within the grounds is carried on by a locomotive using benzol as fuel, which is small enough to

use the turntable at the same time with the cars.

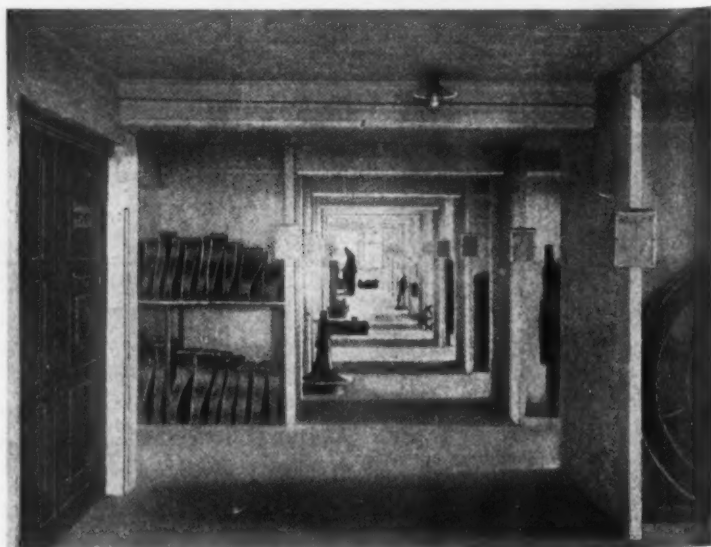
Allowance was made for ample clear space between the buildings, partly to secure yard storage and partly to enhance the lighting of the buildings. The main building is U shaped. The wings are about 328 ft. long, connected by the office building 308 ft. long. Between the wings there is a 230 x 492 ft. one story building, where the heavy machinery is placed. The wings are used as shops for work for which heavy machinery is not required.

In the basement of the executive building are located the wash and locker rooms for the workmen. Above this are the shop offices, the floors of which are elevated 5 ft. above the shop floor for supervision. A hallway 10 ft. in width, outside of the offices, serves as a connecting link between the offices and shops. The sales department is located on the upper floor and on the floor beneath the engineering department. The school for apprentices is located on the third floor.

The main one-story shop consists of a 46-ft. center bay, equipped with 10-ton electric cranes, four 23-ft. bays on the east side, equipped with special devices for handling the transmission parts of the machine tools, and four 23-ft. bays in the west side, equipped with 3-ton electric cranes for assembling. The testing department is also located in this building. Machine tools are tested for production and operating speed according to rated capacity with direct-current motors. Tests are also made for

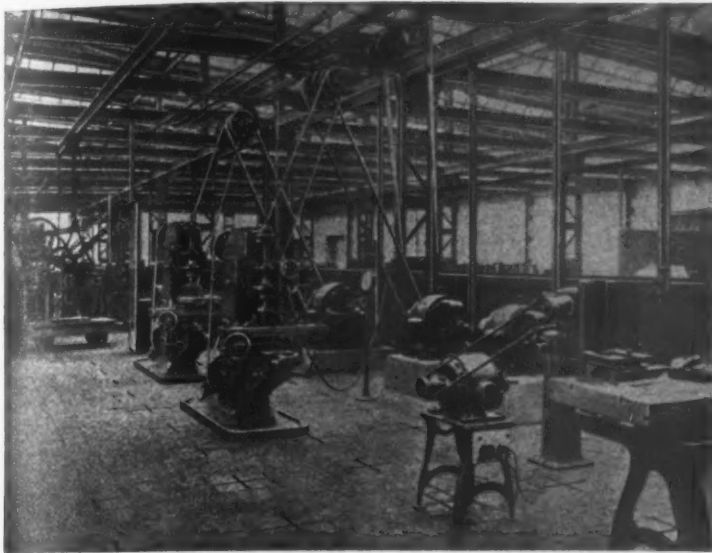
foundations for new type machines.

Connected to the main shop and located on the ground floor of the wings is part of the steel storage, the tool room, cutting-off machines, general storage, storage for semi-finished products and transformer station. Electric power is derived from public service



Interior of Pattern Storage Building, Showing Arrangement of Fireproof Rooms, Each of Which Serves to Store Patterns and Cores Belonging to One Type of Machine

lines at 6000 volts alternating current and transformed to 220 volts. The transformer station is located at the center of distribution of electric power consumption of the whole works in the interest of economy of electrical losses. The foundry is the only other unit having a



A Section of the Workshop Showing Good Light Treatment, Also Group Drive. No special foundations are used for machines with rotary motion

transformer station, as it was shown that this reduced installation and operating cost. The works require from 1000 to 1200 kw., distribution to individual motors being effected partly by means of underground cable and partly through pipe conduit. The motors average 20 hp. used for group drive by means of shafting 65 to 72 ft. long.

The roof is of concrete tile construction. All skylights face the north to keep direct sunlight away from the machinery and the work men. The heating pipes are located just under the skylights and appear to be part of the construction members of the building.

The floor of the main workshop is of wood block on a concrete base and has proved serviceable. Only the heaviest of the machine tools, especially those with reciprocating motion, have special concrete foundations; all other machines are mounted on skids. The shops located in the wings are notable for their light treatment which is accented by good fenestration, comparatively narrow working floor space of 40 ft., and the light color of the ceiling and floor. The floors of these shops are of jack-arch construction supported on I-beams for taking heavy floor loads.

Elevators 6½ x 10 x 13 ft. in size establish communication between the various floors. The elevator shaft, the stairs and toilets form a separate group in the building.

The storage and distribution of the lubricating oils is one of the features of the works. The oil is stored in the basement in iron reservoirs of 500, 1000, 2500 gal. capacity, from which pipe connections lead to the railroad siding. The oil is forced out of barrels, or tank cars into the reservoirs by carbonic acid gas. Accurate measuring devices are installed to keep account

of all oil used. Oil used in automatic screw and other machines is centrifugally cleansed and then filtered for further use.

The outside walls of the large buildings are carried out in slag of a brown violet color. This material possesses the advantage of not showing the accumulation of grime and smoke, unavoidable in works of this character. The inner walls of the U are of glazed tile in order to help the lighting of the one-story shop building.

The pattern storage building is one of the economic features of the works. It is an absolutely fireproof structure of eight stories including the basement, each 8¼ ft. high, divided into a number of small fireproof rooms. Each room serves as a storage place for the patterns belonging to one type of machine, together with the cores. This allows of very easy inspection and is a safeguard against damage by fire. A 3000-lb. capacity elevator is used for the transfer of the patterns to and from the various floors.

The pattern storage building is connected to the engineering department in the executive building by means of an arch gallery. This is to allow the designers to check up old patterns,

so as to avoid as much as possible making of new ones. The space above the arched gallery is used for blueprinting apparatus using natural light. Next to the pattern storage building is the pattern shop which is a two-story slag structure. A special compartment is provided for machines causing dust and making noise.

The laboratory for testing materials is located in the heat treating shop. This includes a metallographic, a chemical and physical laboratory. The foundry has its own laboratory for test-



The Workshop of the Apprentice School. The management is very solicitous about this department and devotes particular attention to it

ing pig and cast iron.

The boiler house is used for heating the entire plant.



The Wash and Locker Rooms Are of White Tile Wall Construction, with Hot and Cold Running Water



The Workmen's Dining Room Is Light and Airy. Meals are served here at noon

It is equipped with two fire-tube boilers with automatic grate stokers. The heat in the flue gas is utilized for heating the feedwater by means of a heat exchanger. Outside the boiler house is a 1500-ton coal storage yard. A crane equipped with a grab bucket takes the coal to the bunkers in the boiler house from which the automatic stokers are fed. Two or three workmen only are required for all of this work. The boiler house is so planned that in case of necessity a power house can be added, equipped with steam turbines, in which case the exhaust steam would be used for heating. Adjoining the boiler house is a building containing fire apparatus, also a building for the compressors, which serves the entire plant with compressed air.

The foundry has a casting floor 71 x 325 ft., constituting the center bay, with lean-tos on either side. In the eastern section are located the cupolas, dryers, sand and core makers and in the western the raw materials, patterns, wash, locker rooms and shop offices. The foundry is equipped with a number of stripping plate molding machines and jarring machines. Sand blast apparatus and pneumatic chipping tools are used for cleaning castings. The foundry is connected to the coke shed by a tunnel, the top of which is equipped with hoppers. The hopper valves serve coke cars, which are taken by elevator direct to the cupolas. The cupolas are equipped with sprinkler systems to prevent fire damage from flying sparks.

Hot air is used for heating the foundry in winter. During the summer months the same system is used for admitting fresh air from the outside, which has proved a great comfort during casting operations. The crane runways extend in the open at both ends in order to facilitate the handling of flasks and finished castings. Provision is made so that the upper part of the end walls can be pushed out in the crane runway and replaced when the crane enters the building.

The firm is particularly solicitous for its apprentices. Practical education is given in a special workshop equipped with all types of machine tools. In addition there are two class rooms, a large drafting room, a lecture hall, library and research department. A large sodded playground with a covered turn hall are used for the physical development of the apprentices.

Installations pertaining to the welfare of the workmen, such as dining room, washrooms, bathrooms, locker rooms and toilets are systematically arranged and well equipped to conform to modern hygienic practice. These rooms are readily cleansed and are easily accessible. The fundamental observed in their location was that all unnecessary steps must be avoided.

The main wash and locker room is located in the basement and is lined with white glazed tile to a height of 6½ ft. It is equipped with rows of wash basins with hot and cold water bibs. The lockers, one assigned

to each man, are also located in this room. The place is lighted electrically and heated. The workmen on the upper floors have similar provisions. The toilets are equally divided on a ratio basis of one cell to 12 workmen. In addition to the wash room there is a special bath house equipped with 10' showers and 10 tubs.

The dining room and kitchen are located in the mansard with a capacity for the preparation of 1200 quarts of food. The kitchen has a white tile floor and is equipped with four steam cooking kettles. In adjoining rooms are electrically driven potato peelers, meat choppers, dish washing machines, knife cleaners, etc. The food is passed from the kitchen to the dining hall through large window openings, which is efficient and allows the workmen to survey the kitchen. Special smaller dining rooms are assigned to the officials and foremen.

In addition to the ground occupied by the plant, the company owns 40 acres of land, which is rented to the workmen for gardening at a nominal price. There are about 200 vegetable gardens. Water for sprinkling is provided by the company.

The plant which is planned to employ from 1000 to 1500 workmen is so laid out that 50 to 100 per cent additions can be made without disturbing the present arrangement.

Less Cast Iron Pipe Made

Figures of the Census Bureau show a heavy reduction in the production of cast iron pipe in 1919, compared with 1914, the figures being 702,550 tons in 1919 and 1,120,720 tons in 1914. This reduction is wholly under the heading of gas and water pipe and fittings, which fell from 909,070 tons in 1914 to 447,880 tons in 1919. There was a healthy increase in production of soil and plumbers' pipe and fittings, from 211,650 tons in 1914 to 254,670 tons in 1919.

Values of various kinds of pipe and cast iron fittings, however, showed a large increase under all headings. The total value of the products of the industry advanced from \$28,102,600 to \$51,902,800. Unit values of cast iron pipe and fittings, per ton of 2000 lbs., in 1914, were \$23.18, as compared with \$69.05 in 1919.

Under the two large tonnage items, the unit value for gas and water pipe and fittings in 1914 was \$21.87 as compared with \$62.79 in 1919. Similarly, the unit value of soil and plumbers' pipe and fittings has advanced from \$29.17 in 1914 to \$80.07 in 1919.

Cast Iron Pipe—Census Bureau's Summary Concerning the Industry—1919

Kind	1919		1914	
	Tons 2000 Lb.	Value	Tons 2000 Lb.	Value
*Total value of products		\$51,902,800		\$28,102,600
Cast iron pipe and fittings	702,550	48,514,600	1,120,720	25,979,200
Gas and water pipe and fittings.....	447,880	28,124,100	909,070	19,805,500
Bell and spigot pipe	375,200	19,257,700	828,900	16,669,600
Flanged pipe ...	23,790	1,714,200	27,290	706,500
Culvert pipe ...	5,660	344,000	11,010	246,500
Fittings	43,230	6,808,200	41,870	2,182,900
Soil and plumbers' pipe and fittings.....	254,670	20,390,500	211,650	6,173,370
All other castings...	16,400	1,614,500	13,580	681,700
All other products...		1,773,700		1,441,700

*Includes 59 establishments primarily engaged in the manufacture of cast iron pipe with products valued at \$50,235,100 in 1919 and \$26,659,360 in 1914; and seven establishments in 1919 and nine in 1914 in other lines of manufacture, reporting cast iron pipe to the value of \$1,667,700 and \$1,443,240 respectively.

Hare's Motors, a corporation formed a year or so ago to take over the management and operation of the companies manufacturing the Mercer, Simplex and Locomobile automobiles, is to be dissolved. The companies making those cars will operate once more as separate units. No definite plan has been made for a reorganization of the Locomobile concern, but have been for the Mercer Motors Co., which owns the Simplex Automobile Co.

Chemical Reactions in Foundry Cupolas

Actions and Reactions — Combustion, Cupola Gases, Carbon Ratio, Melting Efficiency, Metal Losses and Gains — Cupola Balance Sheet

—BY Y. A. DYER*

IN a strict sense, combustion is rapid oxidation accompanied by flame—the product of combustion being a gas or vapor. It may be stated, in the case of cupola combustion, that the carbon in coke and oxygen in air have such strong chemical affinity for each other in the presence of heat that they unite with violence. By the force of their chemical union, combustion is instantly produced and intense heat evolved. The higher the temperature, the more rapidly will combustion proceed. As air is the vehicle which carries oxygen into the cupola and coke the medium of carbon supply, a general acquaintanceship with air, oxygen, nitrogen, carbon and their behavior in the presence of heat becomes necessary to a full understanding of cupola actions and reactions and the products of combustion.

Air and Its Constituents

One cu. ft. of dry air under standard conditions (32 deg. Fahr. and 29.93 in. of mercury) weighs 1.293 ounces, or 0.0808 lb.† The volumes of all permanent gases under uniform pressure increase uniformly with uniform increase of temperature. Expressed in the Fahrenheit scale, a gas expands $\frac{1}{273}$ for each degree increase above 32 deg. Fahr. The volume is proportional to the absolute temperature; that is, to $T - 32 + 490 (= T + 458)$, where T is the temperature in deg. Fahr.

But the volume of a gas is inversely as the pressure upon it, therefore doubling the pressure halves the volume. The density of a gas varies inversely as its absolute temperature. For practical metallurgical purposes the composition of air may be stated in the following ratios and percentages:

	Ratios		Percentages	
	By Volume	By Weight	By Volume	By Weight
Oxygen	21	3	20.8	23.1
Nitrogen	80	10	79.2	76.9

Oxygen (O_2) has molecular weight of 32, density of 16; and one cu. ft. under standard conditions weighs 1.44 ounces or 0.09 lb. Nitrogen (N_2) has molecular weight of 28, density of 14; and one cu. ft. weighs 1.26 ounces or 0.0787 lb. The nitrogen gas of the air is practically inert; remains unchanged in the cupola, and merely dilutes the air and gases, thereby very materially lowering temperatures.

Carbon in the Coke

Coke is a solid fuel containing a high percentage of carbon, and is generally used in the cupola melting process. By the union of its carbon with oxygen an intense heat is produced. The products of this union are carbon dioxide (CO_2) and carbon monoxide (CO) gases or vapors. The quantity of heat generated by a fuel burned in oxygen, its heat of combustion or heat value, is expressed in terms of calories or heat units. The British thermal unit (B.t.u.) is the quantity of heat required to raise the temperature of 1 lb. of pure water 1 deg. Fahr., at or near its maximum density (39.1 deg. Fahr.).

Carbon has a molecular weight of 12; its specific heat above 1832 deg. Fahr. is 0.50; therefore it has atomic specific heat (0.50×12) = 6. The boiling point of carbon, under atmospheric pressure, is reported as 6692 deg. Fahr. Diamond is assumed as relative standard for carbon in the calculation of thermic results, and its heat of combustion is approximately 14,580 B.t.u. Thus the heat of combustion from one

pound of solid carbon, exclusive of heat of vaporization, is 14,580, or in round numbers 14,500, B.t.u. when burned to carbon dioxide.

The heat of vaporization of carbon may be obtained by subtracting the heat of combustion of solid carbon from that of the carbon in the gas. The heat of combustion of solid carbon to carbon monoxide is 4370 B.t.u., effected by 1 lb. of carbon uniting with 1.333 lb. of oxygen to form 2.333 lb. of carbon monoxide. The 2.333 lb. of monoxide gas, in burning to carbon dioxide, generates (2.333×4370) = 10,195 B.t.u., or in round numbers 10,200; therefore, ($10,195 - 4370$) = 5825 B.t.u. represents the heat of vaporization of carbon. Then, the total heat of combustion becomes ($14,580 + 5825$) = 20,405 B.t.u., of which 14,580 are sensible or available heat units for melting and superheating, and 5825 are latent heat units, or heat necessary to vaporize carbon.

Carbon Vapors or Gases

As the gases of the cupola are the products of combustion, or union of carbon and oxygen, and are the heat producing agencies for the melting and superheating of iron, their relative values will be discussed.

Carbon dioxide (CO_2) gas has molecular weight of 44, density of 22; one cu. ft. weighs 1.98 ounces or 0.1236 lb. under standard conditions; and one pound requires for its complete combustion ($\frac{1}{2}$) = 2.667 lb. or 29.6 cu. ft. of oxygen, or 11.517 lb. or 142.44 cu. ft. of air. Carbon dioxide contains 12 parts of carbon and 32 parts of oxygen in 44 parts of gas.

It may be stated that the gas is formed in the cupola by one atom of carbon taking up or uniting with two atoms of oxygen, forming one molecule of carbon dioxide; or 1 lb. of carbon uniting with ($12:32::1:2.667$) 2.667 lb. of oxygen, forming ($1 + 2.667$) = 3.667 lb. of carbon dioxide, creating perfect combustion and generating approximately 14,500 B.t.u. The flame temperature of carbon burned to carbon dioxide in air is reported by LeChatelier as being 3700 deg. Fahr.

Carbon monoxide (CO) gas has molecular weight of 28, density of 14; weighs 1.26 ounces or 0.07875 lb. per cu. ft.; and 1 lb. requires for its complete combustion 1.333 lb. or 14.8 cu. ft. of oxygen; or 5.759 lb. or 71.22 cu. ft. of air. Carbon monoxide contains 12 parts of carbon and 16 parts of oxygen in 28 parts of gas.

It may be stated that the gas is formed in the cupola by the molecule of carbon dioxide (3.667 lb.) taking up, or uniting with, one atom of carbon (1 lb.), forming 2 molecules of carbon monoxide gas (4.667 lb.); or 1 lb. of carbon, by this transfer, is united with only ($12:16::1:1.333$) = 1.333 lb. of oxygen, forming ($1 + 1.333$) = 2.333 lb. of monoxide gas, creating imperfect combustion.

The absorption of heat by carbon monoxide gas is at the rate of approximately 10,200 B.t.u. per pound of carbon charged in the cupola, and the net amount of heat given out when one pound of carbon forms monoxide gas is approximately only ($14,500 - 10,200$) 4300 B.t.u., or less than one-third of the heat generated in the formation of carbon dioxide gas. Hence, in the matter of melting and superheating metal, the advantages to be derived from the carbon dioxide flame become very apparent. The flame temperature of carbon burned to carbon monoxide in air is reported by LeChatelier as 2335 deg. Fahr.

Should the CO gas pick up another atom of oxygen in its ascent through incandescent carbon in the cupola, combustion may be completed. Therefore, if 2.333 lb. of CO takes up 1.333 lb. of oxygen, 3.667 lb. of CO_2

*Birmingham, Ala.

†All ounces, pounds and tons in this article are Avoirdupois; tons are of 2000 lb.

will be formed, and the heat produced per lb. of carbon will be 10,206 B.t.u. The heat produced in oxidizing 1 lb. of CO to CO_2 amounts to approximately $\left(\frac{10206}{2.333}\right) = 4375$ B.t.u. Carbon monoxide burned to carbon dioxide in air has a flame temperature of 3810 deg. Fahr., according to LeChatelier.

Nitrogen Present in the Air

Since 1 lb. of oxygen is contained in 4.32 lb. of air, the amount of air required to burn 1 lb. of carbon to CO_2 is $(2.667 \times 4.32) = 11.52$ lb.; and since each lb. of air contains 0.769 lb. nitrogen, the total nitrogen is $(0.769 \times 11.52) = 8.85$ lb. In the matter of formation of CO gas, the amount of air necessary is $(1.333 \times 4.32) = 5.76$ lb.; therefore, the amount of nitrogen is $(0.769 \times 5.76) = 4.43$ lb.

If more air be supplied to the cupola than is necessary to satisfy each atom of carbon with oxygen, the excess weight of air will absorb additional heat from the fuel and the oxygen present will be left free or uncombined; therefore it will suffer no interference in its attack on the metal.

Carbon Ratio and Flame Temperature

Because of its nonvolatility, no flame is produced in burning solid carbon. But when the temperature in the cupola becomes sufficiently high to raise a portion of the carbon to incandescence, flame is produced by the burning gases. While in the solid state, in the presence of heat, carbon remains incandescent; as it decomposes a gas or vapor is produced in the form of finely dissociated carbon particles that are seen to burn in the cupola and produce flame. The following formula for carbon burned to carbon monoxide illustrates the principle of calculating approximate flame temperature of carbon burned in air:

Parts by weight of oxygen and carbon..	2.333
Specific heat of carbon monoxide at 3200	
deg. Fahr.	0.278
Parts of nitrogen introduced	4.430
Specific heat of nitrogen at 3200 deg.	
Fahr.	0.278
B.t.u. generated	4,385
<hr/>	
$2.333 \times 0.278 + 4.43 \times 0.278 = 2,332$ deg. Fahr.	

If carbon be burned to monoxide in oxygen, the flame temperature would be approximately:

$$\frac{4385}{2.333 \times 0.278} = 6,746 \text{ deg. Fahr.}$$

Therefore, some idea may be formed of the de-italization or drop in temperature caused by the presence of nitrogen in air mixture supplying oxygen for combustion; also of the possible thermal effects of combustion by oxygen.

It will have been noted that the actions and reactions which produce the dioxide and monoxide gases create the flame and heated volume of gases which rise in the cupola and mingle with the descending charges. However, it should be paramount in the mind of the melter that the gas which supplies the intense flame is carbon dioxide, therefore any condition which tends to minimize its formation or lower its flame temperature—such as insufficient air, excessive coke bed and intermediate charges, or excessive air delivery, creating dilution by excess nitrogen and uncombined oxygen—should be eliminated as far as possible.

Sundry tests by many successful melters have proved that the height of fuel bed should be such at all times during the process of operation that at its upper level practically all the oxygen of the air blown into the cupola will have been combined with the carbon in the coke. Such condition will result in the utilization of the maximum flame temperature at the critical point. Ordinarily the greatest constant heat occurs in the cupola between 18 and 36 in. above the tuyeres (depending on size, construction and operation of cupola), where the zone of fusion exists. At this point the theoretical maximum flame temperature created by carbon burning to dioxide would be approx-

$$\text{imately } \frac{14,580}{3.666 \times 0.382 + 8.85 \times 0.278} = 3,777 \text{ deg. Fahr.}$$

In well regulated cupolas the gases usually approximate, by volume, the following range of analyses at the critical point in the melting zone area:

CO_2	15.00 to	16.00 per cent
CO	10.00 to	8.00 per cent
N_2	74.50 to	75.50 per cent
O_2	0.50 to	0.50 per cent

thus creating a carbon ratio $\left(\frac{\text{CO}_2}{\text{CO}}\right)$ of 1.5 or 2 to 1.

Under the conditions met in ordinary practice, an ideal cupola working carbon ratio may be stated as 2 to 1, and with such existing conditions a melting ratio of 10 to 1 will obtain, provided first-class coke is used.

At the zone of fusion the temperature may actually range from 3150 to 3250 deg. Fahr. under approximate gas conditions as stated above—that is: 60 to 67 per cent carbon dioxide and 40 to 33 per cent carbon monoxide; temperatures of the two gases being based on LeChatelier's figures. The temperatures at which the gases leave the cupola vary with rate of driving and height of charging area—ranging from 600 to 700 deg. Fahr. in high cupolas to 1000 to 1100 deg. Fahr. in very low cupolas.

It should be the aim of the melter to select suitable coke, ascertain definite melting zone and so arrange charging conditions, air volume and pressure that as small a portion as possible of the carbon in the coke of upper charges will be transferred to carbon monoxide or consumed as such before reaching melting zone. This feature has an important bearing on the equilibrium of the carbon ratio. Water spraying of intermediate coke charges is often resorted to in extreme cases of too free burning coke. However, the author contends that this method is an expedient—a temporary remedy, not a cure. There is a basic cause, and if coke above the melting zone burns away too readily the character of the coke should be closely examined, cupola construction checked closely, or charging and operating conditions remedied.

Actions and Reactions Simple

Cupola chemical actions and reactions are comparatively simple and stable, compared with blast furnace reactions and chemical equilibrium. In facilitating these actions and reactions the important members of the cupola charge to be dealt with are coke and air. The air blown through the tuyeres supplies oxygen, which immediately sets up a chemical action by combining with the carbon in the coke.

While there is no way of definitely determining which action takes place first, it is reasonable to assume that the carbon of the coke is burned to dioxide instantly, then becomes carbon monoxide by burning solid carbon, which in turn is burned back to carbon dioxide—therefore the actions and reactions become reversible or interchangeable. However, in the cupola the re-burning of monoxide to dioxide occurs too high above the melting zone to be of service for melting. Chemical actions and reactions in the cupola are equated below in substantially the form and order in which they occur:

- 1 Carbon burns to dioxide gas $= \text{C} + \text{O}_2 = \text{CO}_2$.
- 2 Carbon dioxide is reduced by carbon $= 2\text{C} + \text{O}_2 = 2\text{CO}$
- 3 Water and moisture are decomposed $= \text{C} + \text{H}_2\text{O} = \text{CO} + \text{H}_2$

Under average working conditions, temperature about 62 deg. Fahr., barometer 29.6 in., humidity 65 per cent, 1 cu. ft. of air weighs $\left(\frac{0.0808 \times 490}{520} \times \frac{29.60}{29.93}\right) = 0.0754$ lb. and contains by weight $(0.0754 \times 0.231) = 0.0174$ lb. of oxygen. To supply 1 lb. of oxygen under these conditions requires $\left(\frac{1}{0.0174}\right) = 57$ cu. ft. of air. But 2.666 lb. of oxygen are required for complete combustion of 1 lb. of carbon to carbon dioxide gas; therefore, $(2.666 \times 57) = 152$ cu. ft., or 11.46 lb. of air will be required to supply the necessary oxygen to burn 1 lb. of carbon.

If coke has a fixed carbon content of 88 per cent, then each pound of coke will contain 0.88 lb. of carbon. Maintaining intermediate coke ratio to iron charged of 1 to 10 means that the actual melting ratio will be nearer 8 to 1, or about 250 lb. of coke for each 2000

lb. of metal, when account is taken of the portion of coke bed which burns away during the melting process; therefore it will be safe to compute the burning of an average of 250 lb. of coke in melting 2000 lb. of iron; and that coke will contain $(0.88 \times 250) = 220$ lb. of carbon.

Inasmuch as only 60 to 65 per cent of the carbon is finally present at the melting zone as CO_2 , and 40 to 35 per cent as CO gas (an average of 2.16 lb. oxygen to pound of carbon), there will be actually needed for combining weights $(220 \times 0.62 \times 2.67) = 364$ lb. of oxygen for CO_2 and $(220 \times 0.38 \times 1.33) = 111$ lb. oxygen for CO—a total of 475 lb. of oxygen, carrying $(475 \times \frac{10}{3}) = 1583$ lb. of nitrogen, or $(1583 + 475) \div 0.0754 = 27,295$ cu. ft. of air. However, on account of

The gases escaping at 800 deg. Fahr. will carry out the following sensible heat:

$$\text{Volume CO and CO}_2: \frac{214.72}{0.03375} = 6,362 \text{ cu. ft.}$$

$$\text{Volume nitrogen introduced: } \left(\frac{6362}{0.14 + 0.10} \right) - 6362 = 20,146 \text{ cu. ft.}$$

Volume of gases:

$$\begin{array}{l} \text{CO}_2 \text{ 2,672} \\ \text{CO 3,690} \\ \text{N 20,146} \end{array} \quad 26,508 \text{ cu. ft.}$$

Heat losses from escaping gases:

$$\begin{array}{l} \text{N and CO } 23,836 \times 0.0196 \\ \text{CO}_2 \text{ 2,672} \times 0.029 \end{array} \left. \right\} \times 800 \text{ deg.} = 435,728 \text{ B.t.u.}$$

According to Ledebur, the total heat in 1 lb. of cast

BALANCE SHEET
(Per 2000 Lb. Charge)

Materials Charged	Per Cent	Lb.	Unit Weight	Casting Weight	Slag Weight	Gas Weight
Iron:		1950				
Fe	93.11		1815.64	Fe 1808.39	FeO 9.32	
C	3.60		70.20	C 70.20		
Si	1.95		38.02	Si 38.07	SiO ₂ 4.17	
S	0.06		1.17	S 1.17		
P	0.63		12.29	P 12.29		
Mn	0.65		12.68	Mn 9.75	MnO 3.78	
Sand and dirt:		50				
SiO ₂	75.00		37.50		SiO ₂ 37.50	
Al ₂ O ₃	22.00		11.00		Al ₂ O ₃ 11.00	
Alkalies	3.00		1.50		Alkalies 1.50	
Coke:		244				
Free carbon	88.00		214.72			C 214.72
Volatile hydrocarbons	1.30		3.17			CO 3.17
Moisture	0.70		1.71			H ₂ O 1.71
Ash	9.35		22.82		<div> <div>SiO₂ 10.95</div> <div>Al₂O₃ 5.71</div> <div>FeO 4.45</div> <div>CaO 0.49</div> </div>	
Sulphur	0.65		1.58	S 0.60	CaS 2.20	
Limestone:		50				
CaCO ₃	98.00		49.00		CaO 27.44	CO ₂ 21.56
MgCO ₃	0.38		0.19		MgO 0.09	CO ₂ 0.10
SiO ₂	0.97		0.48		SiO ₂ 0.48	
Al ₂ O ₃	0.65		0.33		Al ₂ O ₃ 0.33	
Air:		2010				
O ₂	23.1		464.00			O 458.86
N ₂	76.9		1546.00			N 1546.00
		4304	4304.00	1938.47	119.41	2246.12

blower slippage, bends in pipe, pipe friction, leakage and obstructions, approximately 10 per cent more air must be blown in order to insure the free delivery of this quantity, or $(27295 + 2729) = 30,024$ cu. ft., which practically tallies with the generally accepted blowing unit of 30 000 cu. ft. for each ton of metal charged.

Heat Balance and Melting Efficiency

The heat balance of a cupola, or distribution of heating value of coke—heat utilized for melting and superheating iron, melting and heating slag, expelling water vapor from air and gas (CO_2) from limestone, etc.—may be fairly accurately computed by the aid of certain practical and theoretical factors. Thus—a cupola burning 244 lb. of coke (containing 88 per cent fixed carbon) to melt and superheat 1950 lb. of iron, supply heat for slag and other purposes—with escaping gas containing by volume 14 per cent CO, 10 per cent CO_2 , and 76 per cent nitrogen—will yield the following results:

Carbon in coke passing to gases:

$$244 \times 0.88 = 214.72 \text{ lb.}$$

Carbon in cu. ft. gas:

$$\text{CO } 0.14 \times 0.03375 = 0.00473 \text{ lb.}$$

$$\text{CO}_2 \text{ 0.10} \times 0.03375 = 0.00337 \text{ lb.}$$

$$0.00810 \text{ lb.}$$

$$\text{Gases produced: } \frac{214.72}{0.0081} = 26,508 \text{ cu. ft.}$$

$$\text{Heat power in cu. ft. CO gas: } 7654 \div 22.22 = 344 \text{ B.t.u.}$$

$$\text{Heat of CO in gases: } 0.14 \times 344 = 48 \text{ B.t.u.}$$

$$\text{Heat absorbed by CO gas: } 26,508 \times 48 = 1,272,384 \text{ B.t.u.}$$

Heat power of coke:

$$244 \times 0.88 \times 14,500 = 3,113,440 \text{ B.t.u.}$$

iron melted at 2192 deg. Fahr. is 441 B.t.u. These figures represent the heat units in such cast iron just melted at 2192 deg. Fahr. The mean specific heat for cast iron, from 32 deg. to t deg. Fahr. as reported by Richards, is $0.12 + 0.000046t$. Therefore, to superheat 1 lb. of such metal to (say) 2357 deg. Fahr. would require $2357 \times 0.224 = 528$ B.t.u., or 87 additional B.t.u. for superheating. A gray iron which melts at approximately 2260 deg. Fahr. requires $2260 \times 0.22 = 497$ B.t.u. for melting, and to superheat to (say) 2460 deg. Fahr. would require $2460 \times 0.23 = 565$ B.t.u.

By reason of the lower melting point of white or mottled iron, relatively less heat will be required—thus: assuming a white iron to melt at about 2075 deg. Fahr., it will require $2075 \times 0.21 = 435$ B.t.u. to melt; and to superheat to say 2275 deg. Fahr. will require $2275 \times 0.22 = 500$ B.t.u., or 65 additional B.t.u. for superheating. Because it is more easily oxidized, white iron will not admit of the same degree of superheat as gray iron. It is safe to assume 545 B.t.u. for melting and superheating ordinary gray iron.

It requires approximately 900 B.t.u. to melt and heat a pound of calcium-aluminum-silicate slag. It requires 1846 B.t.u. to expel 1 lb. of gas (CO_2) from limestone. At about 62 deg. Fahr. the air, if saturated, would contain 4.92 grains of water vapor per cu. ft. With humidity of 65 per cent, the air would

$$\text{contain } 4.92 \times 0.65 = 3.20 \text{ grains, or } \left(\frac{26,650 \times 3.20}{7000} \right) =$$

12.18 lb. of water vapor per ton of iron melted. It requires 5780 B.t.u. to decompose 1 lb. of water vapor. Coke exposed to the weather absorbs moisture rapidly—as much as 4 to 17 lb. of water per 100 lb. of coke when exposed to drenching for a period of 2 to 72 hr.

Therefore, if wet coke be used there will be a substantial drawing on the heat balance of the cupola to expel moisture from that source. It requires 1091.7 B.t.u. to vaporize 1 lb. of water.

In summing up the heat losses, and considering the heat necessary to melt the iron and slag, the following theoretical cupola heat balance sheet will fairly represent the useful energy expended for work and energy escaped per 244 lb. of coke consumed in melting and superheating 1950 lb. of metal:

	B.t.u.
244 × 0.88 × 14,500	3,113,440
To melt and superheat iron:	
1950 × 545	1,062,750
To melt and heat slag:	
120 × 900	108,000
To expel water vapor:	
12.18 × 5780	70,400
To expel gas from stone:	
21.66 × 1846	39,985
Improper combustion:	1,272,384
Escaping gases:	435,728
Radiation and conduction:	
By difference	124,393
	3,113,440
Melting efficiency:	$\frac{1,062,750}{3,113,440} = 34.13$ per cent.
Improper combustion:	$\frac{1,272,384}{3,113,440} = 40.86$ per cent.

Cupola Charge Balance Sheet

The following theoretical balance sheet graphically illustrates the final form in which all the materials entering the cupola are disposed of by the melting proc-

ess. Figures used are taken from a test heat made by the author, using 39-in. cupola at the Alamo Iron Works, San Antonio, Texas. Total metal charged was 18,500 lb., composed of 58 per cent machinery scrap, 30 per cent pig iron and 12 per cent soft steel scrap; 2250 lb. Solvay coke and 426 lb. Texas limestone. Total metal, by actual weight, received from the heat was 17,761 lb.; total slag produced 1150 lb.

Reduced to ton basis—iron produced, 1920.1 lb.; coke consumed, 244 lb.; stone burned, 50 lb.; slag produced, 124 lb. Difference in weight between total metal

Slag Analysis:	Per Cent
Si O ₂	44.46
Al ₂ O ₃	14.27
Fe O	11.53
Ca O }	23.48
Mg O }	
Mn O	3.16
Alkalies	1.26
CaS	1.84
	100.00

charged and metal received, 739 lb., or 79.8 lb. per ton of iron melted, as shown by cleaning room record—total loss from all sources, 3.99 per cent. Coke ash analysis, exclusive of sulphur, was 48 per cent silica, 25 per cent alumina, 19.5 per cent iron oxide, lime 5 per cent and magnesia 2.50 per cent. Following are metal mixture and casting analyses:

	Metal Mix	Metal Analysis
Total carbon	3.60 per cent	3.60 per cent
Silicon	1.95 per cent	1.855 per cent
Sulphur	0.06 per cent	0.089 per cent
Phosphorus	0.63 per cent	0.640 per cent
Manganese	0.65 per cent	0.546 per cent.

A New Rail Specification Proposed

Provides for Rolling Tie Plates from Top of Each Ingot—Treatment in Soaking Pits—Lenient as to Cold Straightening

CAPT. ROBERT W. HUNT, head of the firm of Robert W. Hunt & Co., Chicago, inspection, testing and consulting engineers, addressed a letter on Aug. 1 to railroad officials interested and to the principal officers of steel rail manufacturing companies in respect to rail specifications. His connection with the manufacture of steel rails over the entire period of their production lends special weight to any consideration by him of the subject, which in the present case is a specification which he believes will help in rail manufacturers and rail consumers uniting.

A copy of the specification is given below. The principal points of difference between it and other specifications are printed in italics, thus to be easily distinguished.

Captain Hunt admits to claiming for years that each ingot cast on a heat is a unit unto itself and deserving of being tested and treated as such. On Jan. 22, 1912, he recommended the nick and break test on every ingot, and that the method is practicable he now mentions that practically all rails made in Canada for the last six years have been so tested. "But, because of the loathness of American manufacturers to permit it, the system has not been given a thorough trial in the States; and I am now proposing that in lieu of this plan of testing, if the manufacturer desires, the top rails of each ingot can be rolled into tie plates to be hot punched, sheared and annealed, and which the purchaser agrees to accept in place of the tonnage of "A" or top rails that he would ordinarily obtain under his contract. Tie plates made from such steel have given good satisfaction for several years and, no doubt, those manufacturers whose works are not now properly equipped will be glad to install the necessary machinery for producing them in order to aid the railroads in obtaining better rails."

For a number of years he has been convinced, and actual experiences have proved "that the cold straight-

ening of rails can be very much minimized and in some cases eliminated without detriment to the track conditions, and with such obvious saving to the manufacturers as would more than cover the cost of milling the ends of the rails square and free from burrs. Better attention to the soaking pit practice and restricting the cold straightening, I believe, will ultimately afford relief from the development of internal fissures."

The specifications follow:

Specifications for Open-Hearth Steel Rails

80 lb. to 110 lb., Inclusive, Per Yd.

Inspection

ACCESS TO WORKS

1. Inspectors representing the purchaser shall have free entry to the works of the manufacturer at all times while the contract is being executed, and shall have all reasonable facilities afforded them by the manufacturer to satisfy them that the rails have been made and loaded in accordance with the terms of the specifications.

PLACE FOR TESTS

2. All tests and inspections shall be made at the place of manufacture, prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the mill.

Material

MATERIAL

3. The steel shall be made by the open-hearth process.

Chemical Requirements

CHEMICAL COMPOSITION AND ANALYSES

4. (a) The chemical composition of each heat of steel from which the rails are rolled shall comply with the following:

Carbon, not less than	0.60 per cent
Manganese, not less than	0.60 per cent
Phosphorus, not more than	0.04 per cent
Silicon, not less than	0.10 per cent

(b) Rails rolled from heats containing more than 0.75 per cent of carbon shall have the flanges near the ends painted yellow and be shipped separately, provided, however, that such heats do not have either the manganese content over 0.90 per cent or the phosphorus content over 0.03 per cent.

(c) A chemical analysis for each element above mentioned, including sulphur, shall be made on each heat of steel cast for rails. The analysis shall be made on approximately equal portions of carefully mixed drillings taken from two ladle test ingots, one representing the steel going into the second regular ingot cast, and the other that going into the next to the last regular ingot. The methods for making the analyses shall be those adopted by the American Society for Testing Materials.

(d) The ladle test ingots shall be of such shape and size as to induce quick sound setting of the steel, and, if necessary, a few pellets of aluminum may be added to the dipper to insure soundness. The drillings for analyses shall be taken not less than $\frac{1}{4}$ -in. beneath the surface.

(e) The complete analyses of each heat cast for rails shall be available for the inspector as promptly as possible and he shall always be furnished with a copy of it before the rails are loaded.

(f) The inspector may witness the manner of obtaining the drillings for analyses and the methods employed for analyzing, and he may take a portion of the original drillings at any time for checking purposes.

Physical Requirements

METHOD OF TESTING

5. The physical qualities shall be determined by the drop test.

DROP TESTING MACHINE

6. The drop testing machine used shall be the standard of the American Railway Engineering Association.

(a) The tup shall weigh 2000 lb. and have a striking face with a radius of 5 in.

(b) The anvil block shall weigh 20,000 lb. and be supported on springs.

(c) The supports for the test pieces shall be spaced 3 ft. between centers and shall be a part of, and firmly secured to the anvil. The bearing surfaces of the supports shall have a radius of 5 in.

PIECES FOR DROP TEST

7. Drop tests shall be made on pieces of rail not less than 4 ft. and not more than 6 ft. long. These test pieces, except as otherwise provided for, shall be cut from the top end of the rails rolled from the top of the second, middle and last full ingot cast on each heat.

TEMPERATURE OF TEST PIECES

8. The temperature of the test pieces shall be between 60 and 100 deg. Fahr.

HEIGHT OF DROP

9. The test piece shall be placed upward on the supports, and be subjected to impact of the tup falling free from the following heights:

For 80 to 91 lb. rail.....	17 ft.
For 91 to 101 lb. rail.....	18 ft.
For 101 to 111 lb. rail.....	19 ft.

DROP TESTS

10. (a) If two of these test pieces do not break at the first blow, all of the rails of the heat shall be accepted, subject to the requirements of section 11.

(b) If two of the test pieces break at the first blow, all of the top rails of that heat shall be rejected.

(c) Second tests shall then be made from three test pieces selected by the inspector from the bottom end of the top rails of the same heat and ingots. If two of these test pieces do not break at the first blow, all of the remainder of the rails of the heat shall be accepted, subject to the requirements of section 11.

(d) If two of these test pieces break at the first blow, all of the second rails of the heat shall be rejected.

(e) Third tests shall then be made from three test pieces selected by the inspector from the bottom end of the second rails of the same heat and ingots. If two of these test pieces do not break at the first blow, all of the remainder of the rails of the heat shall be accepted.

(f) If two of these test pieces break at the first blow, all of the remainder of the rails of that heat shall be rejected.

DESTRUCTION TESTS

11. (a) A test piece representing the top end of the top rail from each ingot of each heat rolled, which has passed the drop test requirements of section 10, shall be nicked and broken to determine whether the interior metal is sound. If an interior defect shows on the fracture, the top rail of the ingot represented shall be rejected and a second test piece cut from its bottom end shall be nicked and broken to determine the character of the metal of the second rail. If an interior defect shows on the fracture, the second rail shall be rejected and a third piece cut from its bottom end for retesting. Thus the rails of each ingot shall be tested progressively from the top downward until the fracture shows sound metal, following which the rails of the ingot represented shall be accepted.

(b) An interior defect is interpreted to mean seams, laminations, cavities or interposed foreign matter, or a distinctly bright or fine grained structure in the center of the section evidencing segregation, made visible by the destruction tests, the saws or the drills.

(c) Rails represented by test pieces found to be segregated shall be accepted as No. 2 rails.

(d) If, under the drop test requirements of section 10, the "A" and "B" rails of a heat have been rejected, but the "C," "D," "E" etc., rails accepted, the destruction tests herein specified will be waived on the accepted rails of that heat.

OPTIONAL CONDITIONS

12. (a) In case the manufacturer elects after due notice, the purchaser agrees to accept hot sheared, punched and annealed tie plates rolled from the steel that would, in the ordinary course of the manufacturer's practice, be rolled into "A" or top rails from the ingots cast under this specification. It is understood that such tie plates shall be in accordance with purchaser's drawings and specifications.

(b) When a top discard of not less than 20 per cent is made on all ingots from which rails are offered for test and inspection, section 11 shall be waived.

NO. 1 RAILS

13. No. 1 classification rails shall be free from injurious defects and flaws of all kinds.

NO. 2 RAILS

14. (a) Rails which, by reason of surface imperfections, or for causes mentioned in section 11 hereof, are not classed as No. 1 rails, will be accepted as No. 2 rails, but No. 2 rails which contain imperfections in such number or of such char-

acter as will, in the judgment of the inspector, render them unfit for recognized No. 2 uses, will not be accepted for shipment.

(b) No. 2 rails to the extent of 5 per cent of the whole order will be received. All rails accepted as No. 2 rails shall have the ends painted white and shall have two prick punch marks on the heat number side of the web at both ends of the rail, but so placed as not to be covered by the joint bars.

Details of Manufacture

QUALITY OF MANUFACTURE

15. (a) The entire process of manufacture shall be in accordance with the best current state of the art.

(b) The steel must be well deoxidized in the furnace or ladle before the ingots are teemed, and the use of aluminum in the molds to insure the quiet setting steel desired will not be permitted.

(c) Heats or ingots, the metal for which has been poured over the top of the ladle or cast with a full running stopper not under control of the operator, will not be rolled.

(d) Special care must be taken to insure the casting of good, clean, sound ingots, free from scabs and cracks and with reasonably flat tops. Bled ingots shall not be rolled.

(e) Treatment of the ingots in the soaking pits must be such as to insure thorough soaking with the subsequent increase of temperature necessary. Overheated or burned or white sided ingots shall not be rolled, neither shall ingots that have once been allowed to get cold.

LENGTHS

16. The standard length of rails shall be 33 ft., at a temperature of 60 deg. Fahr. Ten per cent of the entire order will be accepted in shorter lengths varying by 1 ft. from 32 ft. to and including 25 ft. A variation of $\frac{1}{4}$ in. from the specified lengths will be allowed. No. 1 rails less than 33 ft. long shall be painted green on both ends.

SECTION

17. The section of rails shall conform as accurately as possible to the template of the section ordered by the railroad company. A variation in height of $\frac{1}{64}$ in. less or $\frac{1}{32}$ in. greater than the specified height, and $\frac{1}{16}$ in. in width of flange, will be permitted; but no variation shall be allowed in the dimensions affecting the fit of the joint bars.

WEIGHT

18. The weight of the rails specified in the order shall be maintained as nearly as possible, after complying with section 17. A variation of $\frac{1}{2}$ per cent from the calculated weight of section, as applied to an entire order, will be allowed.

PAYMENT

19. Rails accepted will be paid for according to actual weights.

STRAIGHTENING

20. (a) The hot straightening shall be carefully done, so that gagging under the cold presses will be reduced to a minimum. Any rail coming to the straightening presses showing sharp kinks or greater camber than that indicated by a middle ordinate of 4 in. in 33 ft., will be rejected. The distance between the supports of rails in the straightening presses shall not be less than 42 in. The supports shall have flat surfaces and be out of wind and the gags shall have their corners rounded to a radius of at least $\frac{1}{4}$ in.

(b) Rails heard to snap or check while being straightened shall at once be rejected.

DRILLING

21. Circular holes for joint bolts shall be drilled to conform to the drawing and dimensions furnished by the railroad company, a variation of $\frac{1}{32}$ in. in size and location being permitted.

FINISHING

22. (a) All rails shall be smooth on the heads, without rough crescent-shaped marks, and the bases shall be free from guide marks and scratches. They shall be milled square on both ends, but a variation of $\frac{1}{32}$ in. in a vertical direction to make head-long rails will be permitted.

(b) All rails shall be free from twists, waves, kinks or short bends, but rails containing a uniform sweep, the middle ordinate of which does not exceed 1 in. in 33 ft., will be accepted without cold straightening.

(c) Rails improperly drilled or straightened, or from which the burrs have not been removed, shall be rejected, but may be accepted after being properly finished.

(d) When any finished rail shows an interior defect at either end, or in any drilled hole, the entire rail shall be rejected.

BRANDING

23. Rails shall be branded for identification in the following manner:

(a) The name of the manufacturer, the month and year of manufacture, and the weight and type of section of rail and the letters "O-H" shall be rolled in raised letters and figures on the side of the web. The type shall be marked by letters, which signify the name by which it is known, as for example:

Sections of American Society of Civil Engineers.....A.S.C.E.
Sections of American Railway Association.....R.A.-A. (or H)
Sections of American Railway Engineering Association.....R.E.

(b) The number of the heat and of the ingot number in the heat and a letter indicating the portion of the ingot from which the rail was made shall be plainly stamped on the web of each rail where it will not be covered by the joint bars. The top rails shall be lettered "A" and the succeeding ones "B," "C," "D," etc., consecutively; but in case of a top discard of 20 per cent the letter "A" will be omitted, the top rail becoming "B."

SEPARATE CLASSES

24. All classes of rails shall be kept separate from each other in loading.

LOADING

25. Rails shall be carefully handled and loaded in such a manner as not to injure them.

Announcement is made that the new 600-ton blast furnace erected by the Trumbull-Cliffs Furnace Co. at Warren, Ohio, will not be started for an indefinite period. The stack was virtually completed and ready to light on July 1.

By-Product Coke Plants in Operation in the United States, May 1, 1921

Owner or Operator—Location	Number of Ovens	Kind of Ovens	Annual Capacity, Net Tons	
			Coal	Coke
ALABAMA				
Alabama By-Products Corporation, Birmingham.....	50	Koppers	335,000	235,000
Gulf States Steel Co., Alabama City.....	37	Koppers	237,000	175,000
Tennessee Coal, Iron & Railroad Co., Ensley.....	240	Semet-Solvay	760,000	530,000
Central Iron & Coal Co., Tuscaloosa.....	60	Semet-Solvay	290,000	220,000
Sloss-Sheffield Steel & Iron Co., Birmingham.....	120	Semet-Solvay	864,000	622,000
Tennessee Coal, Iron & Railroad Co., Fairfield.....	434	Koppers	2,560,000	1,920,000
Woodward Iron Co., Woodward.....	200	140 Koppers, 60 Wilputte (30 Koppers being rebuilt).....	1,330,000	997,200
COLORADO				
Colorado Fuel & Iron Co., Minnequa.....	120	Koppers	720,000	550,000
ILLINOIS				
Chicago By-Product Coke Co., Chicago.....	100	Koppers building	667,000	437,000
Coal Products Mfg. Co., Joliet.....	53	35 Koppers, 18 Wilputte.....	340,000	238,000
Illinois Steel Co., Joliet.....	280	Koppers	1,500,000	1,200,000
International Harvester Co., South Chicago.....	88	Wilputte	578,000	376,000
North Shore Gas Co., Waukegan.....	13	Semet-Solvay	55,000	38,500
St. Louis Coke & Chemical Co., Granite City.....	80	Roberts	400,000	250,000
By-Products Coke Corporation, South Chicago.....	280	Semet-Solvay	1,300,000	975,000
INDIANA				
Central Indiana Gas Co., Muncie.....	22	Klonne	40,000	28,000
Citizens' Gas Co., Langsdale.....	41	Semet-Solvay	255,000	182,900
Citizens' Gas Co., Prospect.....	140	100 United-Otto, 40 Wilputte.....	567,000	409,400
Illinois Steel Co., Gary.....	700	Koppers	4,400,000	3,480,000
Indiana Coke & Gas Co., Terre Haute.....	60	30 Gas Mach., 30 Koppers.....	292,000	205,000
Inland Steel Co., Indiana Harbor.....	130	Koppers	890,000	666,000
Linton Gas Co., Linton.....	3	Gas. Mach.	15,000	9,300
Steel & Tube Co., Indiana Harbor.....	120	Semet-Solvay	864,000	622,000
KENTUCKY				
Kentucky Solvay Coke Co., Ashland.....	108	Semet-Solvay	864,000	648,000
MARYLAND				
Bethlehem Steel Co., Sparrows Point.....	360	Koppers	2,190,000	1,576,000
MASSACHUSETTS				
New England Fuel & Trans. Co., Everett.....	400	United-Otto	650,000	455,000
MICHIGAN				
Ford Motor Co., Dearborn.....	120	Semet-Solvay	864,000	622,000
Michigan Alkali Co., Wyandotte.....	54	United-Otto	169,200	118,400
Semet-Solvay Co., Detroit.....	215	Semet-Solvay	1,343,000	1,009,000
MINNESOTA				
Minnesota By-Product Coke Co., St. Paul.....	65	Koppers	400,000	300,000
Minnesota Steel Co., Duluth.....	90	Koppers	600,000	450,000
Zenith Furnace Co., West Duluth.....	65	United-Otto	160,000	112,000
MISSOURI				
Laclede Gas Light Co.....	56	Koppers (8 Piette building).....	320,000	240,000
NEW JERSEY				
Camden Coke Co., Camden.....	100	United-Otto (37 Koppers building).....	240,000	68,100
Seaboard By-Product Coke Co., Kearny.....	165	Koppers	1,200,000	900,000
NEW YORK				
Donner-Union Coke Corporation, Buffalo.....	150	Koppers	1,000,000	650,000
Empire Coke Co., Geneva.....	46	Semet-Solvay	146,000	102,200
Lackawanna Steel Co., Lackawanna.....	530	188 United-Otto, 282 Rothberg, 60 Semet-Solvay	1,350,000	972,000
Semet-Solvay Co., Solvay.....	40	Semet-Solvay	65,000	45,000
Wickwire Steel Co., Buffalo.....	60	Semet-Solvay	386,000	289,500
OHIO				
American Steel & Wire Co., Cleveland.....	180	Koppers	1,080,000	750,000
Brier Hill Steel Co., Youngstown.....	84	Koppers	520,000	379,000
Hamilton-Otto Coke Co., Kokotto.....	100	United-Otto	240,000	168,000
McKinney Steel Co., River Furnaces.....	204	Koppers	1,300,000	960,000
National Tube Co., Lorain.....	208	Koppers	1,200,000	850,000
Penn Iron & Coal Co., Canal Dover.....	24	Roberts	144,000	100,000
Republic Iron & Steel Co., Youngstown.....	143	Koppers	1,020,000	744,600
Otis Steel Co., Cleveland.....	100	Semet-Solvay	450,000	337,500
Ironton Solvay Coke Co., Ironton.....	60	Semet-Solvay	432,000	311,000
Portsmouth-Solvay Coke Co., Portsmouth.....	108	Semet-Solvay	770,000	559,000
Toledo Furnace Co., Toledo.....	94	Koppers	560,000	408,800
United Furnace Co., Canton.....	47	Koppers	280,000	204,400
The Youngstown Sheet & Tube Co., Youngstown.....	306	Koppers	2,050,000	1,425,000
PENNSYLVANIA				
Allegheny By-Product Coke Co., Glassport.....	120	United-Otto	260,000	195,000
Bethlehem Steel Co., Bethlehem.....	424	Koppers	2,400,000	1,920,000
Bethlehem Steel Co., Lebanon.....	90	Semet-Solvay	640,000	465,000
Bethlehem Steel Co., Steelton.....	180	120 Semet-Solvay, 60 Koppers.....	876,000	621,500
Cambria Steel Co., Franklin.....	492	210 United-Otto, 92 Koppers, 190 Cambria-Belgian	1,839,000	1,226,000
Cambria Steel Co., Rosedale.....	60	Cambria-Belgian (60 Cambria-Belgian building, 885 Semet-Solvay building)	*286,000	192,000
Carnegie Steel Co., Clairton.....	768	Koppers	4,800,000	3,360,000
Carnegie Steel Co., Farrell.....	212	United-Otto	830,000	581,000
Jones & Laughlin Steel Co., Pittsburgh.....	300	Koppers	2,000,000	1,300,000
Philadelphia Suburban Gas & Electric Co., Chester.....	40	Semet-Solvay	125,000	87,500
Pittsburgh Crucible Steel Co., Midland.....	100	Koppers	667,000	435,000
Rainey Wood Coke Co., Swedeland.....	110	Koppers	800,000	600,000
American Manganese Mfg. Co., Dunbar.....	110	Semet-Solvay	248,000	173,000
RHODE ISLAND				
Providence Gas Co., Sassafras Point.....	40	Koppers	240,000	165,000
TENNESSEE				
Chattanooga Coke & Gas Co., Alton Park.....	24	Semet-Solvay	175,000	125,000
WASHINGTON				
Seattle Lighting Co., Seattle.....	20	Klonne	24,000	18,000
WEST VIRGINIA				
Domestic Coke Corporation, Fairmont.....	60	Koppers	400,000	260,000
La Belle Iron Works, Follansbee.....	94	Koppers	610,000	445,000
National Tube Co., Benwood.....	120	Semet-Solvay	270,000	189,000
WISCONSIN				
Milwaukee Coke & Gas Co., Milwaukee.....	160	Semet-Solvay (150 Koppers building)	750,000	562,500
Steel & Tube Co. of America, Mayville.....	108	United-Otto	450,000	384,000

*Refers to 60 Cambria-Belgian ovens now standing.

BY-PRODUCT OVENS

Steady Progress of the Modern Method of Coke Making in the United States

According to a report by the U. S. Geographical Survey, supplemented by a check up by THE IRON AGE, there were built and building in the United States as of May 1, last, 12,245 by-product coke ovens, with an annual coal carbonizing capacity of almost 59,000,000 net tons, yielding almost 44,000,000 net tons of coke. Actual figures of coal and coke capacity cannot be given for the reason that data are lacking pertaining to some of the ovens in course of construction. The figures given, which include all plants now standing and some which are being built, however, provide reasonably close approximations and as such convey a clear idea, when supplemented with figures as to the total production of coke, of how big a part the by-product plants have in supplying the coke requirements of the country. In the war period, pressure of the demand for iron, steel and other metals smelted with coke as the principal fuel, sent up the production of coke sharply, a total production of 56,478,185 net tons being reached in 1918. The following year saw a big drop in production, due to labor disturbances in the steel and coal industries. But from a total of 44,821,000 net tons in 1919, the coke production jumped to approximately 51,500,000 net tons in 1920. The normal annual requirements of the country may be placed at between the production for 1919 and 1920, or about 47,000,000 net tons. On that basis, the by-product ovens would be capable of producing more than 93 per cent of the coke needed, and this fact strengthens the oft-repeated assertion that in a short time all of the coke used in this country will be from by-product ovens.

New by-product coke oven construction in the past year has been light, due to the high cost of labor and materials, but it is interesting to note the steadily upward slant of installations over a period of years. Between 1893 and 1908, there were put into operation 3799 ovens of this kind, capable of producing 4,201,226 net tons of coke. In 1918, according to Geological Survey data, there were 9282 ovens with an annual capacity of 32,200,000 net tons of coke. Thus in 10 years, there was a gain in installations of more than

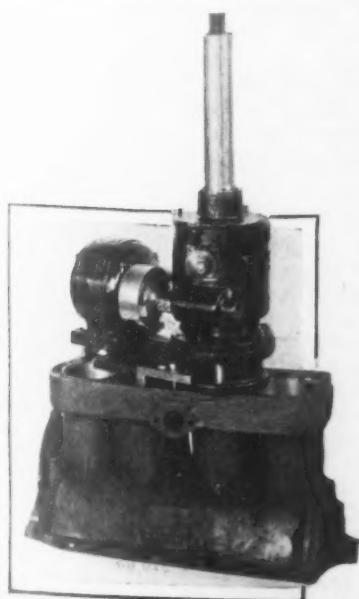
240 per cent. The gain in the war period was marked, 3011 new ovens being constructed from 1915 to 1918, inclusive. This showing in no small measure is accountable to the war time demands for the coke oven by-products, exclusive of coke. As is quite natural, the increase in the number of by-product ovens has been accompanied by a decrease in the number of the older type ovens. In 1910 there were in this country 100,362 beehive coke ovens; at the end of last year there were 84,635, Geological Survey reports show. Production figures show that in 1919, the output of by-product oven coke for the first time went ahead of that from beehive ovens. The total production that year was 44,821,000 net tons, of which beehive ovens produced 19,650,000 tons and by-product ovens 35,171,000 tons. Last year, when total production was 35,505,000 net, the distribution was 30,680,000 tons of by-product and 20,825,000 tons of beehive oven coke.

Pennsylvania has the greatest number of by-product ovens of any State in the Union, the number being 3951, distributed among 13 plants and having a capacity of 11,156,000 net tons of coke a year. Ohio stands next with 1658 ovens capable of producing 7,197,000 tons of coke and Indiana third with 1216 ovens having a capacity of 5,601,700 net tons. Alabama has 1141 ovens with a capacity of 4,699,200 tons; Colorado 120 ovens, with a capacity of 550,000 tons; Illinois 894 ovens which can turn out 3,861,000 tons; Kentucky 108 ovens with a capacity of 648,000 tons; Maryland 360 ovens with a capacity of 1,576,000 tons of coke a year; Massachusetts 400 ovens with a potential production of 455,000 tons; Michigan 389 ovens having an output per year of 1,749,000 tons; Minnesota 220 ovens and 862,000 tons; Missouri 64 ovens and 240,000 tons; New Jersey 302 ovens and 968,000 tons; New York, 826 ovens and 2,058,000 tons; Rhode Island 40 ovens and 165,000 tons. Tennessee 24 ovens and 125,000 tons; Washington 20 ovens and 18,000 tons; West Virginia, 274 ovens and 894,000 tons and Wisconsin 418 ovens and 946,500 tons.

A summary of the ovens built and building shows 11,185 built and 1240 in process of construction. There are 6156 Koppers ovens built and 287 building; 2455 Semet-Solvay ovens built and 885 building; 1657 United-Otto ovens built; 282 Rothberg ovens built; 250 Cambria-Belgian ovens built and 60 building; 206 Wilputte ovens built; 104 Roberts ovens built; 42 Klonne ovens built; 33 Gas Machinery ovens built and 8 Piette ovens building.

Cylinder Reboring Tool

The Van Dresser electric tool for reboring cylinders now has the motor built in a unit with the tool,



Cylinder Reboring Tool Having Motor an Integral Part of Unit

as shown by the accompanying reproduced photograph. It has a range from 2¼ to 5 1/16 in. The bearings are 10¼ in. in length. It has a tapered arrangement for fitting the boring head into the feed bar, emphasized as ensuring accuracy, and a quick return feature that allows the boring head to be brought instantly to the starting point. Another feature is the elimination of split guide rings. Without making changes, this tool can be used by a hand or drill press. The machine is

marketed by the International Purchasing & Engineering Co., McKerchey Building, Detroit.

German Pig Iron Production

For nearly two years past the Association of German Iron and Steel Manufacturers has kept back the statistics of the home production of pig iron and of steel materials, but recently the German Ministry of Commerce and Industry published a set of figures stating that the capacity of output within the present frontiers of Germany is approximately 960,000 (metric) tons of pig iron monthly, or, in round figures, 11,500,000 tons a year, says the London *Ironmonger*. This does not include the Saar district, which is capable of producing 1,300,000 tons yearly, but is at present under French control. It is stated that the production of pig iron throughout the years 1919 and 1920 averaged between 400,000 and 500,000 tons monthly, or only one-half of the capacity. These returns do not agree with the figures already published by the Association of Iron and Steel Manufacturers. These are available until the end of October, 1919, and show a total output of 5,281,025 tons for the first 10 months of that year, or an average of 528,000 tons per month.

The Republic Rubber Corporation, Youngstown, Ohio, has resumed operations at its plant after a suspension of several weeks, under the direction of H. C. Booth, receiver. Employment will be given to about 700 operatives for an indefinite period.

Electric Furnace Heat Treatment

Dies and Forgings Well Handled in Metallic Resistor Furnaces—Uni- formity of Product a Big Feature

BY E. F. COLLINS*

IT is being rapidly and conclusively demonstrated that electric heat will offer advantages equal or greater, in reheating and general heat treatment of steel, than it has done in melting and refining. A striking expansion in the use of the electric resistance furnace for the heat treatment of steel is shown in the past five years, and progress in the demands of industry is sure henceforth to require the overall economy and high quality which accompany the use of electric heating for such processes, as (1) annealing, (2) carburizing, (3) hardening, and (4) tempering or drawing of steels.

Important heat treating processes, in which the forge shop should be interested, and for which the metallic resistor electric furnace is peculiarly adapted, will be enumerated and briefly described, so that the working field for such a type of furnace may be clearly indicated. We may, for convenience, consider electric heat treating furnaces under two heads, viz., (1) those used in production of dies and metal cutting tools and (2) those employed in the heat treatment of drop forged parts.

Four Separate Processes Considered

The production of drop forge dies involves the following heat treating processes: (1) annealing, (2) carburizing, (3) hardening, (4) drawing.

In hardening drop forge die blocks, it is claimed that much trouble is obviated by annealing the blocks before performing machine operations on them. Bringing blocks up to the proper annealing temperature at a rate of perhaps 45 min. for each in. of thickness, followed by cooling in the furnace, insures against trouble such as warping and checking or cracking on hardening. The proper annealing temperature varies with the carbon content and the width of the critical range varies likewise. The Committee of the American Society for Treating Materials recommended the following range in temperatures:

Carbon Content	Annealing Temperature Range
Less than 0.12%.....	1607 to 1697 deg. Fahr. (875 to 925 deg. Cent.)
0.12 to 0.25%.....	1544 to 1598 deg. Fahr. (840 to 870 deg. Cent.)
0.30 to 0.49%.....	1499 to 1544 deg. Fahr. (815 to 840 deg. Cent.)
0.50 to 1.00%.....	1454 to 1499 deg. Fahr. (790 to 815 deg. Cent.)

Steel should be held at the annealing temperature for a period of time which varies with the size and shape of piece. It is important that the piece be heated through uniformly at the annealing temperature. Where quality of output is the watchword, modern heat treatment is not attempted without first carrying out correct annealing treatments as a proper foundation for subsequent processes.

Automatic Control With Autographic Records

Graphic record from an electric annealing furnace employing two thermocouples, one on the surface of the steel charge and the other near the resistor, shows the furnace controlled automatically. With the charge entering at 11.05 a. m., its surface reaches the desired annealing temperature of 1500 deg. Fahr. at 4 p. m. Complete equalization of the temperatures in the charge has occurred at 4.40 p. m. From this time on, the piece maintains a uniform temperature until removed from furnace or until power is shut off.

Here the perplexing question as to when the steel is heated uniformly throughout is not answered by guess, but it is clearly and definitely shown on the

record of automatically controlled temperatures for the annealing cycle. Further description of this temperature chart would not be necessary to demonstrate that such equipment as this is practically ideal for annealing drop forge die blocks. Coupled with this heat control is a furnace atmosphere free from injurious products of combustion, and a heating by uniform radiation rather than by cyclonic convection blasts of hot gases met within the ordinary fuel-fired furnace.

Forging, forming and cutting dies may be made from high carbon steels (0.70 to 0.95 per cent carbon), hardened and drawn, or from low carbon steel (0.15 to 0.25 per cent carbon) case-hardened, the latter virtually eliminating the danger which exists with high carbon steel of spoiled dies through warping and cracking.

Heat Control Essential for Hardening Also

All theories concerning hardening are united upon the necessity of heat control as outlined for annealing. Hence the electric furnace, already described as suited to annealing, may be used just as successfully for heating high carbon steel dies which are to be hardened by quenching. No doubt can exist in the mind of the operator of the electric furnace as to the exact time when the die block, be it large or small, has reached an absolutely uniform temperature throughout. Hence, other things being equal, successful hardening can be thwarted only by improper quenching.

The electric furnace has important advantages for the carburization stage of the case-hardening process, where it is evident that close regulation and control of temperature, as well as uniform delivery and distribution of heat, are essential for best results. Uniformity of product requires that each part of the charge be subjected as nearly as possible to the same heat cycle, whether it be near the center of the carbonizing box or near its outer walls. The electric furnace with its automatic control will bring each part of a charge of material to the same temperature, through the control of a surface couple on that charge. Electric furnaces may be designed to give practically the same heat in each carbonizing box constituting the furnace charge, even though the control is actuated from pyrometer on a single box. In other words, uniform heating conditions exist throughout the heating chamber.

Remarks already made concerning the use of the electric furnace for hardening high carbon steel dies apply equally to heating for the quench of carburized dies.

Why and How to Draw the Temper of Dies

The temper should be drawn on all hammer dies, to relieve strains and to give resiliency or spring, resulting in better wearing qualities. An oil tempering bath electrically heated is a most satisfactory tool, and the hardened dies should immediately go into it even before the die is quite cooled from the hardening operation. The temperature of the oil bath should be about 400 deg. Fahr. In other words, hardened stock is "tempered" by being reheated to about 400 deg. Fahr., where it loses considerable brittleness and yet little of its hardness, making it suited for dies and metal cutting tools; reheated to 480 deg. Fahr. it is less brittle and suited for use in rock drills, stone cutting tools, etc.; at 525 deg. Fahr. it is suited to dental and surgical instruments, hack saws, etc.; at 570 deg. Fahr., the maximum usually employed, it may be used for wood saws, springs, etc. Sudden cooling after tempering does not affect hardness or softness of steel; hence

*Consulting engineer, Industrial Heating Department, General Electric Co. Abstract of paper read at meeting of American Drop Forge Association, Chicago, June 24.

when taken from the oil bath, it may cool either rapidly or slowly.

Sizes and Types of Electric Furnaces Used

Electric furnaces for heat treating drop forge dies and metal cutting tools are usually of the box type. Such furnaces, of the metallic resistor type, operate at temperatures up to 1800 deg. Fahr., and may be had with automatic control as previously described. A large furnace suited to heating large dies, punches and cutters at temperatures not exceeding 1800 deg. Fahr., and equipped with automatic control, made the following performance, as compared with a similar oil-fired furnace on the same work:

	Electric	Oil-Fired
Dimensions, heating chamber.....	30 x 36 in. x 22 in. high	48 x 24 in. x 20 in. high
Average temperature held.....	1450 deg. Fahr.	1400 deg. Fahr.
Fuel or power to hold at 1400 deg. Fahr.....	8.04 kw.	1.65 gal. per hr.
Cost per hr. to hold 1400 deg. Fahr.....	*10c.	†23.1c.
Amount of steel heated per hr.....	84 lb.	84 lb.
Fuel or power for heating steel.....	13.35 kw.	1.9 gal. per hr.
Cost fuel or power per hr.....	16.7c.	26.6c.
Cost per lb. heating steel.....	0.199c.	0.317c.

*At 1.25c. per kw. hr. †At 14c. per gal.

These results may be surprising to those who base their calculations solely on relative B.t.u. costs for oil and electricity. Were the upkeep costs included, the difference in favor of the electric furnace would increase, since in the past two years, the upkeep of this furnace has been practically zero.

Treatment of Drop Forgings Analogous to That of Tools

The foregoing has applied to the electric furnace for heating processes in producing drop forge dies and metal-cutting tools. A much greater field for the electric furnace lies in the heat treatment of drop forgings. Here we meet again the annealing, hardening by quenching, case hardening, and tempering or drawing processes. The metallic resistor furnace is here again ready to demonstrate its superiority in heating processes involving 1800 deg. Fahr. or less. The designs of furnace must comply with methods of handling a production having volume and tonnage. Electric heat can be utilized with practically all types of furnace, such as car bottom type, pusher type, conveyor type, box or tunnel type, either of vertical or horizontal construction. All furnaces may be well heat lagged without danger to refractories, and at the same time secure low thermal capacity, resulting in quick heating.

Performance Figures for Forging Heat Treatment

A vertical design of furnace has been constructed in capacities of from 200 kw. to 2700 kw. per unit; the latter has the ability to heat forgings weighing 320,000 lb. per charge. Actual performance figures for this type of furnace, when used for hardening and drawing, may be seen in the following table:

Charge	Weight, Charge and Holders (Heated to 1450 Deg. Fahr.)	Energy Kw. Hr. (400 Kw. Connected)
12 3-in. gun tubes	21,900 lb.	1874
7 4-in. gun tubes	22,300 lb.	1880
3 4-in. gun jackets	21,700 lb.	2080
Total	65,900 lb.	5842
Average lb. per kw. hr.	$\frac{65,900}{5,842} = 11.25$	
Average kw. hr. per ton	$\frac{5,842}{2,000} = 2.921$	
Energy cost at 1.25c. per kw. hr.	$11.25 \times 1.25 = \$2.23$	per ton.

Drawing work back to 1100 deg. Fahr., a yield of 24 lb. per kw. hr. was realized, equal to 84 kw. hr. per ton. Combined power consumption for hardening and drawing per ton was 262 kw. hr., or with power at 1.25c. per kw. hr., a cost of \$3.28 per ton. In other words, 7.7 lb. of steel was hardened at 1450 deg. Fahr. and drawn back to 1100 deg. Fahr. for every kw. hr. Four furnaces operating for one month, continuously hardening and drawing at 1450 deg. Fahr. and 1100

deg. Fahr. respectively, showed a total gross power consumption of 325 kw. hr. per ton of steel treated.

New Methods of Manipulation Unnecessary

The use of the electric furnace does not call for new methods of manipulation of present heating processes, but rather fits itself into standard and generally accepted heat treating requirements admirably, removing practically all uncertainties connected with proper application of heat; and eliminates almost entirely the handicaps inherent in fuel-fired furnaces.

For quality heat treating the electric furnace is rapidly replacing the fuel-fired furnace. Its simplicity, its dependability, its low upkeep, its improved prod-

ucts, its ability to turn out repetition work free from defects, are some of the factors which contribute to economy of operation in such a degree that, with prevailing rates for electric heat and fuels, the electric furnace usually shows an "overall" cost per piece less than that treated in the fuel-fired furnace. The writer has in mind a case where the saving in rejects alone, due to the use of electric heat over gas, was sufficient to pay for the total current used for heating, more than 75 times.

Discussion by Harold F. Wood*

We have followed with interest the many factors in the development of electric furnaces for the heat treatment of steel. The majority of industrial electric heat treating furnaces in use up to this time are for the treatment of finished machine parts such as gears, pinions, dies, etc. In this type of work we must secure freedom from distortion as well as freedom from decarbonization of the finished surface. Many thousands of dollars worth of finished parts are lost, due to the above causes, which loss can be reduced to a minimum by the use of a properly designed electric furnace.

Drop forgers have wished many times that they could have a safeguard against decarbonization in the heat treatment of dies in which the impression has already been sunk. With complete freedom from surface decarbonization, the life of dies is materially increased. Electric heat surely is the logical method to employ on this type of work, as the ultimate cost is the important cost, and this is the item to consider rather than a purely technical comparison on a B.t.u. basis.

Dependability of Drop Forgings and Castings

Drop forging is the only method whereby parts can be made one like another and free from blow holes, dross, etc., which are the defects that cause castings to be undependable. The drop forge industry is, therefore, vitally interested in the heat treatment of forgings. The forge shop is the logical place to heat treat forgings, as it enables the drop forger to supply his customer not only with a product that is within the tolerances demanded but also one that will show the proper physical characteristics and thereby give the proper service.

In other words, it becomes quite necessary from a metallurgical standpoint that the modern drop forger buy material to a chemical specification and sell the finished forgings to a guaranteed physical specification. This requires a very efficient heat treating department. In the production of a forging like a crank shaft, it is a fact that over half the labor cost of the

*Chief metallurgist Ingalls-Shepard Division, Wyman-Gordon Co., Harvey, Ill. Paper before American Drop Forge Association, Chicago, June 24.

crank shaft is consumed in performing operations after it leaves the forge shop proper, of which heat treating is a vital factor.

In the case of a forging, the question of scaling during the heat treating operation is not an important item if any degree of judgment is used by the furnace operator. Distortion is an important item, but from actual experience the difference in distortion on forgings heat treated in an electric furnace and a fuel fired furnace cannot be detected, as it is too small to interfere in any way in meeting the specifications with ordinary straightening operations. The up-to-date forge shop is equipped with a modern circulating system for fuel oil, and the cost of supplying oil to oil-fired furnaces consists merely in running feeder lines from the main circulating line. The furnace-hour burden on this is at most a very small item.

The drop forger, therefore, must study the electric furnace vs. the fuel-fired furnace on the following items, and be guided accordingly in making his decision on which type of equipment to install to produce lowest ultimate cost of heat treating:

1. Total fixed charges
 - (a) Land and buildings factor
 - (b) Equipment factor
 1. Interest
 2. Taxes
 3. Depreciation
 4. Repairs
2. Indirect labor
3. Supplies other than repairs
4. Power or fuel
5. General factory burden
6. Miscellaneous charges
7. Direct labor
8. Uniformity of results as determined by per cent practice obtainable; which in turn is determined by the heat uniformity of the furnace, provided the forgings are of proper chemical analysis and all from the same melt of steel.

If we take for purposes of comparison a battery of electric furnaces and the same number of oil fired furnaces, both types having the same hearth area and able to produce the same tonnage per furnace hour, we can easily see which type of installation is the most economical to install. The following factors are the same on either installation:

Land and buildings, Indirect labor, Supplies, General factory burden, Miscellaneous charges, Direct labor.

Equipment Factor Variable

Interest and taxes on the electric furnace are approximately twice those of the oil, because the first cost is in this proportion. Depreciation and repairs on a well built oil furnace will be approximately at a 5 per cent higher annual rate than on a well built electric furnace. Due to the higher first cost of the electric furnace, the actual dollars and cents loss from depreciation and repairs over a period of a year amounts to more in the case of an electric furnace, in spite of its lower percentage rate.

Power or Fuel Consumption

Mr. Collins gives in his paper a value of 262 kw.hr. per ton power consumption for hardening at 1450 deg. Fahr., and tempering at 1100 deg. Fahr. on a single heat, and a value of 325 kw.hr. per ton as a total gross power consumption on four furnaces operating for one month on continuous duty. The latter figure is the important one, as it indicates what can be accomplished in actual production over a period of time. On the electric furnace at our Harvey plant we have watched the power consumption very closely, and find a value of 318 kw.hr. per ton for hardening at 1525 deg. Fahr. and tempering at 950 to 1000 deg. Fahr., for a period of three months. This is in very good agreement with the value given by Mr. Collins. A power consumption of 318 kw.hr. per ton treated represents a thermal efficiency of 68.2 per cent.

On well-built oil-fired furnaces we have secured a total gross oil consumption of 30 gal. per ton treated, using 1525 deg. Fahr. hardening heats and 950 to 1000 deg. Fahr. tempering heats. On the basis of 140,000

B.t.u. per gallon, an oil consumption of 30 gal. per ton treated represents a thermal efficiency of 17.62 per cent.

Uniformity of Results in Oil-Fired Furnace

Mr. Collins states in his paper that it is possible to regulate electric heat to plus or minus 5 deg. Fahr., and fuel fire to plus or minus 50 deg. Fahr. Our experience in regard to regulation of electric heat agrees very closely with this; however, we cannot agree with him on the regulation of a fuel-fired furnace. We have several oil-fired furnaces in operation in our plants which we control to a variation of plus or minus 10 deg. Fahr., while coming up to heat, and to a total variation of plus or minus 5 deg. Fahr. during the soaking period. This is about the limit of uniformity that can be obtained in commercial practice by either an electric or oil-fired furnace. From a uniformity standpoint there is, therefore, no preference in one type of furnace over the other.

It is seen, therefore, that in the selection of heat treating furnaces for treating drop forgings, the factor which determines the most economical installation is cost per 100,000 B.t.u. effective. In the following table are given the corresponding costs per kw.hr. and per gallon of oil, based on the above conclusion that 318 kw.hr. are equivalent to 30 gal. of oil:

Cost per Kw. hr.	Cost per Gal. of Oil	Cost per Kw. hr.	Cost per Gal. of Oil
0.20c.	2.12c.	1.20c.	12.72c.
0.30c.	3.18c.	1.30c.	13.78c.
0.40c.	4.24c.	1.40c.	14.84c.
0.50c.	5.30c.	1.50c.	15.90c.
0.60c.	6.36c.	1.60c.	16.96c.
0.70c.	7.42c.	1.70c.	18.02c.
0.80c.	8.48c.	1.80c.	19.08c.
0.90c.	9.54c.	1.90c.	20.14c.
1.00c.	10.60c.	2.00c.	21.20c.
1.10c.	11.66c.		

In going over the above table one can tell at a glance which type of installation is the more economical to install, based on the particular contract prices on power and oil possible to obtain in a given locality. This table indicates that there are very few sections in the country at the present time that would make an installation of electric furnaces for heat treating drop forgings an economical investment.

This, however, should not in the least discourage the friends of electric furnaces for heat treating drop forgings, as the drop forge plant offers wonderful possibilities for the generation of electricity from waste exhaust steam by means of low pressure steam turbine generators. It is now possible to generate electricity by this means at a total cost, including all overheads on generator plant and transformer equipment, at a price not to exceed 0.40c. per kw.hr. This will show a very large saving over the very best price that can be secured on oil now or in the future, and is without doubt the most economical installation for the heat treatment of drop forgings.

The plant of the recently organized Damascus Tool Co., Oakmont, Pa., has begun operations. This company, which specializes in the manufacture of pneumatic hammer snaps and also makes punches, punch dies, pneumatic chisels and bull dies, is headed by T. S. See as president and general manager, with J. L. Conner as vice-president and general superintendent. Mr. See formerly was superintendent of the Keystone Works, Jones & Laughlin Steel Co., Pittsburgh, and Mr. Conner also formerly was identified with Jones & Laughlin Steel Co., having been master mechanic at Southside Works of that company. M. F. O'Conner is sales manager of the company.

The George J. Hagan Co. recently secured an order from the Mutual Enamel Ware Co., Chattanooga, Tenn., for one twin chamber electric furnace to be used for enameling bathtubs. This furnace has a total connected load of 399 kw. for operation on 440 volts, 3-phase, 60-cycles. The company also has taken a contract from the Illinois Watch Co., Springfield, Ill., for a special rotary electric furnace to be used for enameling watch dials. This furnace has a rating of 31 kw. and is for operation on 220 volts, single phase, 60-cycles.

Improvement in Open-Hearth Details

New Arrangement of Reversing Furnace Valves Promotes Economy—Burners for Liquid Fuel and Tar—Results in Operation

— BY A. G. SCHUMANN* AND A. F. SCHUMANN —

AS the valves of an open-hearth furnace have important duties to perform, it is necessary that they be well constructed, and so arranged as to prevent loss of fuel both during the furnace operation and while being reversed. The latter requirement makes it advisable that they be arranged to reverse as quickly as possible. They should also be handled in such a way as to require little of the furnace man's time and energy.

For proper furnace operation it should be possible to regulate independently both the amount of incoming gas and air and the flow of the outgoing gases through the gas and air regenerators. This is important in maintaining a proper ratio of temperatures between the two, and is of particular importance in economical furnace operation of furnaces of large capacity.

Study of open-hearth furnaces in the United States shows that many of them have reversing valves operating on crude principles which make the operation of the furnaces less efficient and economical than it should

in spare parts in stock usually have to be carried.

All water cooled apparatus in the path of incoming and outgoing gases will collect dirt and tar, etc., particularly if producer gas is used. This results in the loss of gas up the stack, a reduction in the draft of the stack and makes one end of the furnace pull against the other. Valves, however, which have no protection whatever against the intense heat to which they are subjected, will very shortly warp, with consequent leakage.

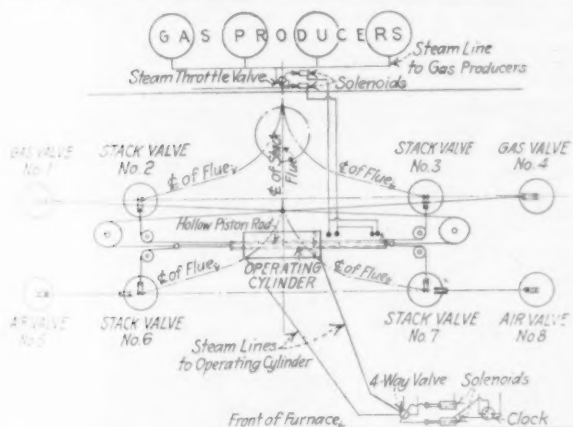
New Automatic Reversing Device

A reversing apparatus developed by the writers has been applied to four 200-ton tilting furnaces at Sparrows Point. The previous valves were continually leaking producer gas, because of the dirt and tar accumulating on the water-cooled valves and seats. The use of the mushroom-turning valve stopped these leaks, and kept the seats clean of the dirt and tar from the gas. The arrangement is such that it is possible to take the valve and seat out for repairs, when necessary, without delaying the operation of the furnace.

The diagrammatic plan of the arrangement of valves and operating mechanism shows that the control is located in a clock-work, which reverses the furnace valves every 15 or 20 minutes by means of solenoids, actuating a four-way valve controlling the steam supply to the long cylinder, which moves the furnace valves. By a system of pulleys and take-ups the operation of closing one valve and then immediately opening the other is performed without taking the attention of the furnace man, and without the loss of time so frequently required when the man has to walk from one end of the furnace to the other or clear across the charging floor to get at the different valves. By properly adjusting the timing mechanism, the reversing takes place with great regularity instead of depending upon a man's thoughtfulness or lack thereof, which results frequently in leaving gas on one end of the furnace much longer than on the other, with consequent lack of uniformity in temperature of the entering flame.

In the design shown here, the valve movement for complete opening and closing is placed at 5 ft. The piston in the operating cylinder travels a total of 7 ft. 8 in., and is so connected with the valves by the telescoping piston rods and the series of pulleys that the proper motion is applied to the several valves. Referring to the diagram:

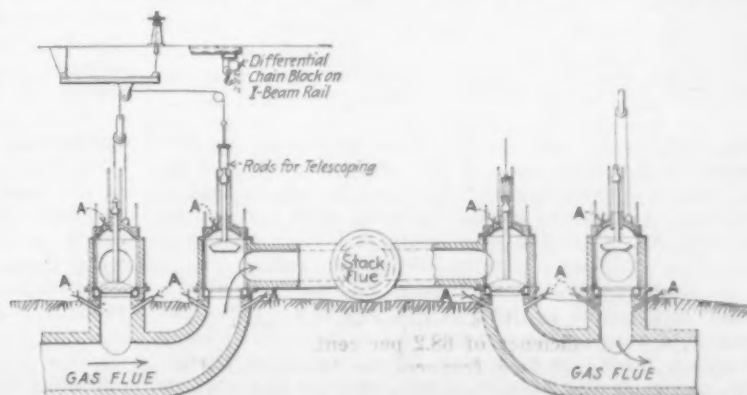
While the piston travels 30 in., gas valve No. 1 will travel 60 in. and be closed, valve No. 3 will be lowered 30 in. and No. 7 will be lowered 60 in. Valves Nos. 2, 4 and 6 will be telescoped 30 in. The piston



Diagrammatic Plan Showing Arrangement and Operation of the Eight Valves, All from the Action of One Operating Cylinder

be. In efforts to overcome this, complicated and expensive mechanism has sometimes been installed which requires too large a part of the furnace man's time and energy. Besides, too much time is taken in reversing the furnace, resulting in leaving the gas off so long as to slow up the furnace operation and retard the heat.

Water seals on the stack draft, and allowing water to be drawn into the furnace with the incoming air and gas, will also cause a slowing up of the time of the heats, and may eventually require the shutting down of the furnace because of clogging up of the checkers due to moisture in the incoming gases. This causes long delays and results in heavy expense for the labor of cleaning out the regenerators. In case valves need repairs while the furnace is in operation, further delays are encountered, for it is rarely possible to do anything to the valve without shutting down the furnace temporarily, or running it over-long in one direction. Besides these delays, heavy investments



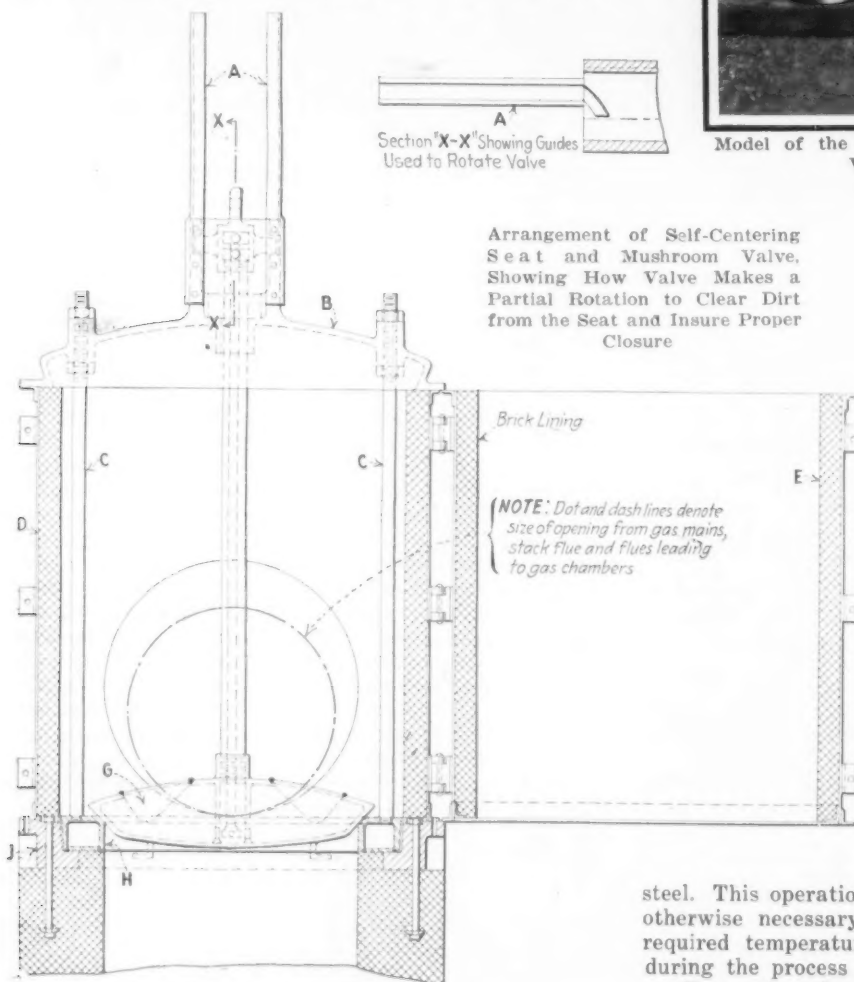
Section Showing How the Automatic Reversing Valves Are Interconnected and How a Valve Needing Repairs Is Handled

*Master mechanic, Bessemer and open-hearth departments, Bethlehem Steel Corporation, Sparrows Point, Md.

will then travel 2 in. farther to allow the gas valve No. 1 to be seated properly. This drops valve No. 3 an additional 2 in., telescopes No. 7 about 2 in., and increases the telescoping effect on Nos. 2, 4 and 6 to 32 in. After the piston travels 30 in. farther, valve No. 2 will be open 30 in., No. 6 will be telescoped 60 in. and Nos. 3 and 7 will be closed with a telescope of 32 in. At this point gas valve No. 4 will be telescoped 62 in. During the next 30 in. travel of the piston, valves Nos. 2, 4 and 6 will be opened 60 in., No. 3 will be telescoped 32 in. and Nos. 1 and 7, 62 in. The air valves are closed by the stack valves Nos. 6 and 7, and regulated by the stand on the charging floor.

This operation requires the cylinder to have a total stroke of 7 ft. 8 in. for a valve travel of 5 ft. When the furnace has started to reverse, the travel of the piston rod forms a contact to operate one of the solenoids in the gas producer building. This closes the steam throttle and shuts off the steam on the gas producer. When the furnace is completely reversed, the rod forms another contact which operates the other solenoid, and thus opens the steam throttle valve.

Each time the valves come within 3 or 4 in. of seating, the guides A (shown in the detail of the valve and chamber) will slightly rotate the valve, and thus grind all the foreign matter off of both the valve and its seat, and allow it to seat properly. The cover B, valve G and seat H are held together in one unit by



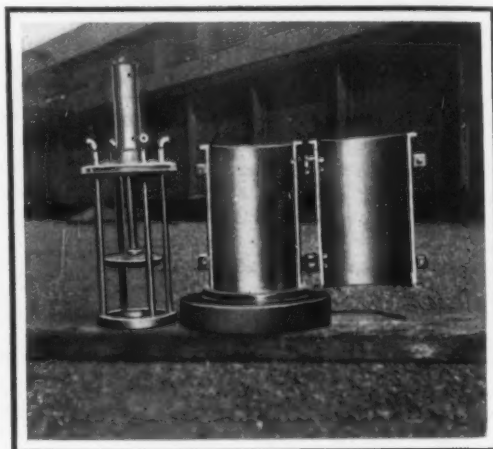
the water inlet and outlet pipes furnishing cooling water to the valve seat. The valve casing (D and E) is split in halves, one half being on hinges so that it may swing open, and permit the hood, valve and seat to be removed by means of a chain and block arranged over the valve, as shown in the vertical section.

A spare valve and seat may then be swung into place and located on the cast iron holder J. After the casing is swung shut and bolted together, the furnace is again ready for reversing. Preparatory to taking out and replacing a valve, a sand damper is placed in the gas main leading to that valve, thus blocking off the gas until the exchange can be effected.

To standardize the valves, and thus reduce the investment in spare parts, the valves on all the gas and air flues are made of the same size, and are interchangeable. The inlets and outlets for the valves, however, will be smaller for the gas flues than for the air flues, so as to maintain the proper ratio of stack draft for the air and gas chambers.

Furnace Equipped for Oil Fuel

To enable the furnace to utilize either light or heavy crude oils, as well as tar recovered from the by-product coke ovens, an arrangement of burner, to go with the form of the valve described above, has been applied to the 200-ton furnaces, which are arranged



Model of the New Reversing Valve, Showing Valve Out of Casing

so that they may burn either producer gas or the liquid fuel. The change between the two forms of fuel is effected easily, for the burner and burner coolers may be taken out of the gas ports or reinstalled without delaying the operation of the furnace.

A section in the longitudinal diagram shows the arrangement of one of these furnaces, which has been on the oil and tar burning system for the last two years; while five 50-ton tilting furnaces at the same plant have used this system for five years.

One incidental advantage, resulting from the ease of changing between systems, appears when the furnaces are running on producer gas. At such times the burners are put back into the gas ports during the period while the gas mains are being burned out, and the furnace is thus kept in operation to make bottom or melt

steel. This operation saves both the time and the fuel otherwise necessary to get the furnace back to the required temperature after it has been cooled down during the process of burning out the mains.

Every time the valves are reversed, the same mechanism pulls back into its cooler, to a distance of about 1 in., the burner which has just been in operation, and at the same time shifts into position the burner at the other end of the furnace. This protects the burner not in use from the intense heat of the tip of the outgoing flame, projected across the furnace from the other burner. At the same time, the oil or tar and the vaporizing steam are shut off the burner going out of use, and turned on back of the burner going into use.

This dual operation is performed by a cable device operating triple cut-off valves, shown in the detail view of the burner arrangement at one end of the furnace. The operation of this device is so quick that, while the

flame is going off of one burner, the flame from the opposite burner is following it across the furnace. If, for any reason, hand operation is desired, the 4-way valve may be operated by hand independently of the clock.

Temperature control of the automatic reversing device is possible by aid of properly constructed pyrometers in the two regenerators. As soon as one regenerator is brought up to the predetermined temperature at which reversing should take place, contact is made by the pyrometer to operate the solenoid, just as the clock does it. Alternative methods, such as the small cylinder shown in the detail of the furnace end, may be used to operate the burners.

Electrically operated reversing valves may readily be used in place of those operated by a steam or hydraulic cylinder, by using a single motor, a train of gears or a worm and worm gear and one drum. This would require a limit switch to control the automatic operation of the valve. By placing the drum on a crank shaft, it could be arranged to make the valve mechanism fool proof, in case the limit switch fails to operate properly.

The main features of the automatic operation of this burner include perfect control of the temperature of the entering flame, simplicity of operation of burners, both while reversing the furnace and between reversals, and absence of leaky valves for shutting off oil and steam, as the triple cut-off valves can be made absolutely tight. This system also obviates frequent changing of the burner tips.

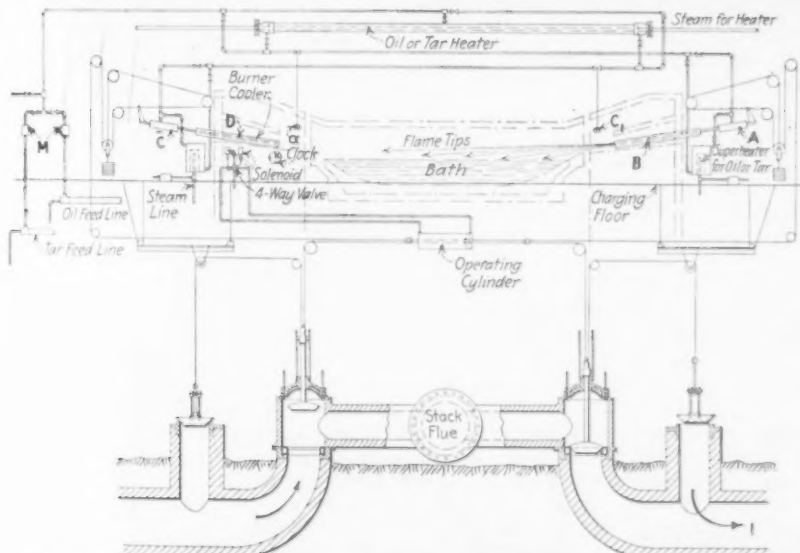
Each burner has at its tip a number of fuel-discharge ports from which the combustible vapor is projected in jets. Uniting, at a short distance from the burner, with the preheated air from the air port above

the burner, the combustible from these jets produces a long flame, of which the tip will reach and extend over the entire surface of the metal in the bath. The use of shallow ports permits the flame to reach its objective sooner and, by having fuel-discharge ports of various depths, the jets have various lengths, resulting in the flames reaching over the surface of the bath more uniformly than if the entire mass of combustible vapor and air were projected uniformly. This results in heating the portions close to the burner, as well as those in the center and near the other end of the furnace, and promotes uniformity of temperature throughout the entire area.

As the several fuel-discharge ports are inclosed in



Assembled Model of Reversing Valve



Diagrammatic Section Showing Application of Balanced Automatic Reversing Device to Regenerative Open-Hearth Furnace Using Liquid Fuel

one casing and controlled by one regulation, this permits the delivery of the flame at any desired distance from the burner. The fuel is atomized in each port at the tip of the burner, where the steam or air is at its highest velocity. This is due to the meeting at the restricted portion of each port, of the fuel with the steam or preheated compressed air.

Since the atomized fuel and the air or steam expand immediately after this atomization, the mixture becomes so thorough that heavy fuel, such as tar or Mexican crude oil, may be burned efficiently. The length and intensity of the flame are regulated by controlling the admission to the burner of the air or steam and the oil or tar. By thus obtaining great uniformity in temperature throughout the bath, a more even oxidation of the bath is secured. Results from operation of furnaces fitted in this manner

are shown in the table.

Test number	I	II	III	IV	V	VI
Size of furnace (tilting)	50-ton	200-ton	200-ton	200-ton	200-ton	200-ton
Charge (in lb.):						
Hot metal	40,000	80,000	.....	.....	60,000	55,000
Plate scrap	45,000	33,000	85,000	95,000	170,000	175,000
Pit scrap	10,000	.....			
Tin scrap	20,000	79,900	40,000	40,000	.....	.....
Broken molds	15,000	48,200	75,000	75,000	55,000	55,000
Pig iron, cold	.....	.....	70,000	60,000	.....	.....
Crop ends	.....	33,600	.....	.....	.....	.....
Total	130,000	274,700	270,000	270,000	285,000	285,000
Manganese (tapping)	..	1,300	.....	.....	.....	.....
Limestone	..	..	28,000	..	28,000	..
Burnt lime	..	..	..	17,000	..	17,000
Time (in hours):						
Charging	..	1 1/2	2	2	2	2
Melting and making	..	8	9 1/2	9 1/2	8	8
Total for heat	7 1/2	9 1/2	11 1/2	11 1/2	10	10
Product, ingots						
Lb.	..	259,900	..	..	..	..
Tons	..	116	..	..	..	..
Yield, per cent.	..	94.2	..	..	..	..
Kind of steel	Plate	Plate	Sheet bar	Plate	Sheet bar	Plate
Tar consumption (gal per ton of ingots)	35	29	34	34	31.5	31.5

It may be noted that the 200-ton furnaces are emptied at each heat, and are not used on the Talbot process. The bottoms in the furnace have been raised so that the capacity has been reduced to about 150 tons. The ladle used, while rated at 110 tons capacity, will hold as much as 125 tons of steel, which is the maximum amount to which the furnaces are charged.

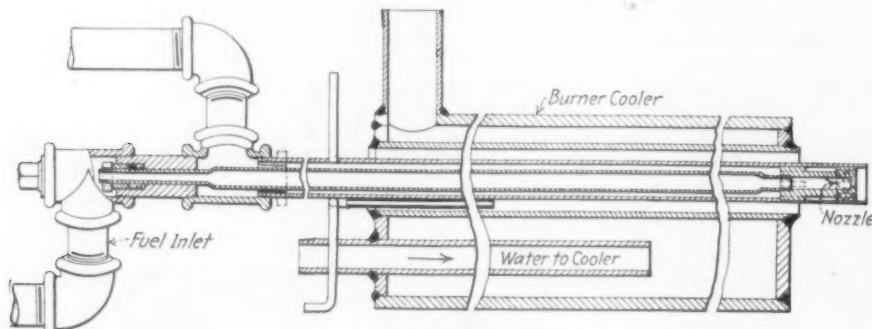
While open hearth managers have long been accused of lack of attention to those details of design and operation which would make for efficiency in the consumption of fuel, it is believed that both of the designs described in this article will go a long way to prove that the charge is not universally true. There is less unburned fuel going into the regenerators and up the stack by this means than under ordinary producer gas operation; this is shown by the fact that only a tiny tip of flame may be seen going into the discharge ports of the furnace, when looking between the chills at the furnace end. This compares with the heavy flame visible, passing this point when producer

gas is used, or with certain other types of burners.

Another exceptional feature which should promote long life for the furnace roofs and walls lies in the uniform temperature from one end of the furnace to

nace, due to loss of draft from interposed resistance.

During the month of May comparison was made between furnaces operated with the new type burners and reversing valves, using tar, and others using producer gas. Based on 165,000 B. t. u. for one gallon of tar and 12,000 B. t. u. for one lb. of coal, it is estimated that the new burners save 23 per cent of the fuel value required by the old ones, and 32 per cent of the fuel value required when using producer gas. The time of making a heat of 120 tons of steel was reduced by 1½ to 2 hours and the yield increased by 2 to 3 per cent. Calculation of the cost of making steel at the Maryland plant, compared with other Bethlehem plants, showed that the Maryland plant made it at about \$3.50 less per ton than at Bethlehem, and \$6 less per ton than at Steelton.



Section of the Oil and Tar Burner, Showing Arrangement of Parts

the other, in place of the alternate heating and cooling, relatively speaking, which accompanies other methods of operation. This should save much money in repairs and much time in furnace operation, especially as compared with the extreme cases where the roof is actually sweating on one end and not much more than cherry red at the incoming end.

Uniformity of temperature and consequent equality of oxidation of the bath are made manifest when comparing the final and semi-final tests taken from the steel ladle. These show average analyses with much less variation than were obtained when using producer gas or other types of burners. This would promote that homogeneity in the steel so necessary under modern specifications.

It is possible to design the burner to suit the peculiarities of the furnace for which it is intended, and to produce the type and direction as well as dispersion of flame required. The burner may be designed for tar or oil or coke oven gas. For the latter, the gas is forced to the burner under several ounces of pressure, while preheated air, either from an air compressor or a positive fan, is used to mix with the gas for producing the length of flame required.

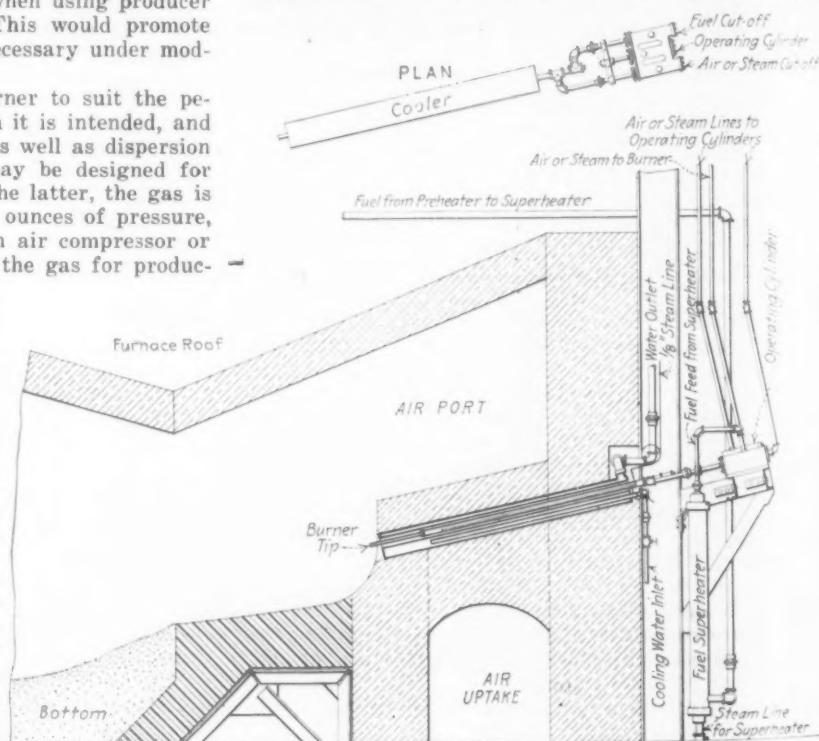
By reducing the lost time at and following reversal of the furnace, quicker melting and more uniform oxidation are obtained, and the heat of steel is made in less time. This also should increase the yield, due to a smaller percentage of oxidation of the metal. Comparison of yield figures, before and after the new arrangement was installed, show a gain of from 3 to 4 per cent. The effect of the gain in yield is shown by the fact that three of the 200-ton furnaces under the new arrangement were producing as much steel as the entire group of four furnaces using producer gas or the former type of burner, and this steel is reported to be of better quality.

A blower has been placed on top of the stack flue, similar to the blowers used under producers, to siphon out the hot gases from the flue and use them to dry ladles, stopper rods, converter bottoms, etc. A newly lined 30-ton recarburizing ladle was recently dried by this gas in the same length of time an oil burner would have required. The consumption of compressed air for this purpose was about one-half as great as that required to atomize the oil or tar for the burner previously used for this same type of ladle. Arrangements are now being made to dry all the ladles with this waste heat.

Of course, where a furnace is equipped with a waste heat boiler, the hot gases can be taken off for boiler use after leaving the fan. The same fan can be designed to force the hot gases to the place of their utilization, without hindering the operation of the fur-

New Warehouse for A. M. Castle & Co.

Work has been started by A. M. Castle & Co., Chicago, on the construction of a new steel warehouse at Blackhawk and North Branch streets, Chicago. The building will be 211 x 232 ft., of steel with pressed brick facing walls, steel sash, concrete floors and cement tile roofing, making a thoroughly fireproof building. The west 75 ft. is to be two stories in height and the second



Section Through Center Line of Port and Plan of Burner, Cooler and Cylinder Arrangement

floor will afford an office space 75 x 211 ft. for the general offices of the company.

The main building will be used for the storage of sheets, tubes, cold rolled shafting, rivets, bolts, bars and boiler accessories. Materials will be handled by means of four electric traveling cranes, with entrances for trucks from the street under each crane. Carload shipments will be handled from switch tracks that terminate within the building after passing under each crane runway. With this new plant, the buildings of A. M. Castle & Co. will cover over five acres.

The Alvord Reamer & Tool Co., Millersburg, Pa., has reduced operations to a three-day week schedule. The company has been working on full time in the majority of departments.

Thomas Devlin: A Pioneer in the Malleable Foundry Business

SIXTY-SEVEN years in the malleable foundry business is the record of Thomas Devlin, president of three companies, the Thomas Devlin Mfg. Co., with plants in Philadelphia, and Burlington, N. J., Hardware & Malleable Iron Works and the National Specialty Co., both of Philadelphia. And, although 83 years old, he is still very active in business, going to his Philadelphia plant early each morning and taking charge of operations. He missed but two days at the plant in the past year; he has never had a vacation, except for five trips to Europe, including Ireland, and three trips to the Pacific Coast.

Thomas Devlin is the oldest active malleable iron man in the United States, from standpoint of both age and period of service. His success is indicated by his extensive membership in business organizations, some 30 in number, including the Philadelphia Foundrymen's Association, of which he is president; the National Association of Foundrymen; the American Foundrymen's Association, of which he is an honorary member; the Hardware Merchants and Manufacturers' Association; the Engineers' Club of Philadelphia; the Philadelphia Chamber of Commerce; the National Chamber of Commerce and the Manufacturers' Club. He is a happy example of a self-made man, his school education having consisted of the meager training which the common schools of Ireland could give, supplemented later by night school studies in this country. He came to the United States at the age of 16. His business career started with him in the role of office boy at \$1.50 a week, paid to him on Mondays rather than Saturdays, lest he be tempted to spend this munificent sum with reckless abandon during the week end.

He has seen some great changes in the foundry business. In 1854, for instance, the best molders received \$1.50 a day for a 10 or 11 hr. day; now his molders get \$7.20 for an eight-hr. day. Molding machines have largely replaced hand molding; annealing methods have changed; the pots are piled four high, instead of two high; there were not over 50 employees in the foundry and finishing department in which he started to work, while the three plants can now employ from 1800 to 2500 when running at full capacity. Because some of the customers preferred to substitute drop forgings for castings, he recently installed drop forging equipment, thereby retaining these customers of half a century.

In speaking about the evolution in the use of pig iron, Mr. Devlin reminisced as follows: "All of the old foundrymen thought they must have Scotch iron in the early days to produce good machinery and hardware castings. Then they used pig iron to make malleable iron castings which was made in New York and known as Sterling, and we thought the 'jig was up' when we couldn't get it. Later we discovered that good iron was being made from Lake Superior ore. We also used some Crown Point iron in our mixture for malleable purposes. All came by rail, except some which we imported from Sweden. We have thought that recent prices for pig iron were the highest in history. I remember when the company had to pay \$60 for malleable pig iron in the early days; it was smelted with charcoal and hence the high cost. Lehigh Valley irons were also popular."

The merchandising methods of Mr. Devlin's enter-

prises are unique in that they have never employed salesmen. The only sales activities are the publishing of advertisements in the trade journals. His companies sell through commission houses in New York and through them, until recently, much export business has been received. One of the New York connections has been handling their products exclusively for the past 38 years. Customers in California who patronized Mr. Devlin 35 years ago, still buy his products.

The long periods of service of many of the employees is a feature of the business. The oldest worker has been with Mr. Devlin for 55 years and never worked for any other concern, and several others have passed the half century mark of service. Employees' holdings total 32 per cent of the outstanding capital of the companies. Four of the directors are employees of the companies. One of the companies has originated a system by which employees are given the earnings of \$1,000 worth of stock for a term of five years on the condition that the employees give to the company continued and faithful service during that period, and that the employees contribute \$2 a week,

this being retained by the company towards the purchase of the \$1,000 worth of stock. Many, spurred on by the enjoyment of dividends before completing the purchase, have added more to the first \$1,000 worth. Mr. Devlin has had but one strike since he has been a manager. He expresses the outcome in a paradox that would do credit to G. K. Chesterton: "We won, but we lost—we won the strike, but we lost \$50,000 because of suspension of operations."

Mr. Devlin's companies make fittings for steam, water and gas, harness hardware, saddlery hardware, marine and awning hardware, registers, dampers and jobbing work. The original company made experimental castings for the first sleeping car berths about 1856 through Kimball & Gordon, car builders, who were later succeeded by J. G. Brill Co.; it manufactured castings for Blake & Willard mowing machines, Reyburn & Hunter lightning rod fasteners, Conrad Liebrick trunk locks and work for Henry Diaston & Sons. For several years, it made castings for molasses faucets for a company before it decided to build its own factory.

The Philadelphia Hardware & Malleable Iron Works was started by Thomas R. Wood & Co. in 1852. The firm changed to E. Hall Ogden Jan. 1, 1855. It was the first bench shop in Philadelphia, the first malleable shop in Pennsylvania and was one of four malleable shops in the United States.

When THE IRON AGE representative called at the home of Mr. Devlin, he found a man whose appearance belied his 83 years of age. He found a short, well set-up man, with alert eyes and good complexion, wearing a grey suit with small black checks, whose trimness a younger man might well copy. He had been reading the *Literary Digest*, an indication that his interest is broader than affairs of gray and malleable iron. The quick replies to the many questions placed before him showed a mind as alert as his appearance. He tells the story of his career as follows:

"On Aug. 4, 1854, I was engaged as office boy by E. Hall Ogden, who was with the company of Thomas R. Wood & Co. I received as compensation \$1.50 per week with the understanding that I would get an ad-



THOMAS DEVLIN

vance of 50 cents every six months. I continued until early in 1857 when there was a money panic. The shop was closed and I went to school for four months. The shop reopened in October, 1857. I went to work again and continued until 1865, when I was given an interest in the Philadelphia Hardware & Malleable Iron business with Mr. Carr, a salesman, and Mr. Crawley, the bookkeeper, each getting one-eighth of the net profits without salary, Mr. Ogden getting five-eighths. The first year my interest was a little over \$5,000 and Mr. Ogden had more net profit that year than he had ever made before. That interest, without salary, continued until 1870 when Mr. Ogden, being in ill health, sold the business to Carr, Crawley & Devlin.

"Our firm started officially on Jan. 1, 1871. Outsiders, who did not know conditions, supposed that I was taken into the business as partner in consequence of the knowledge that I had of manufacturing and

that Carr and Crawley had the capital, when the truth was that I had more money invested in the business than the other two. The names were arranged according to age, Carr being the oldest, etc.

"Carr, Crawley & Devlin continued in business until 1880 when I became dissatisfied because we were not progressing. Four years after the dissolution Carr & Crawley failed and after their double failure, Mr. Ogden's son attempted to run the business, but lost money. Our company made him an offer for the business which he accepted and we took it over in 1892 and have made money ever since."

Mr. Devlin had 11 children, eight of whom are still living. Two sons are associated with him: William J. Devlin, vice-president and manager of the plants at Third and Lehigh avenues, Philadelphia, and Burlington, N. J., and Frederick M. Devlin, vice-president and treasurer, located at the plant at Ninth and Jefferson streets, Philadelphia.

Interchangeable Manufacture Discussed*

Fundamental Principles—High Cost of Unnecessary Accuracy—Analyzing Conditions—Holding Extremely Accurate Dimensions to Minimum

IN dealing with so broad a subject as interchangeable manufacture, it is well to remember that in the course of time many false traditions and pseudo-scientific conditions are built around a process or system, either glorifying it unduly or condemning it beyond its deserts. This makes it necessary to be iconoclastic and tear down that we may build upon a firmer foundation, sometimes rearranging the former material and sometimes rejecting it. Likewise, it is well to start out with certain fundamentals plainly stated, and any discussion or theory that contravenes these fundamentals is useless for our purpose. True, we may dispute the fundamentals and possibly disprove them, but the statements hold until that shall have occurred. Personally, however, the author disbelieves in fundamentals, and prefers to employ the term "progressive standards."

Fundamental Principles

The first fundamental is that no two things are alike; the second, that the difficulty of maintaining accuracy increases in geometric ratio with each added accurate dimension on the same piece; the third, that no machine or tool under stress can be accurate; the fourth, that the manufacture of interchangeable parts in quantity is a matter of percentage; and the fifth, that irrespective of the method used, quality is a matter of insistence.

Nowhere, either in the arts or crafts, do we find two things alike. Nature herself has never succeeded in making two leaves or two grains of sand the same as far as man has ever been able to determine. Poe, in one of his essays, states that analysis consists of taking two things exactly alike and looking at them and continuing to look at them until we discern that which differentiates the one from the other, and our ability in that direction indicates our power of analysis.

The nearest approach to mechanical perfection that we know of is found in the Johansson gages, or was until the advent of the Hoke gages; but within their limits these are by no means interchangeable and the interferometer shows not only a variation in size but a difference in parallelism of the same piece.

Securing one very accurate dimension on a piece is a comparatively simple matter. The ease of securing two accurate dimensions, however, depends upon the relation of the second to the first. The figures given in the following table are based upon practice and general impressions, but the author believes them accurate

enough to justify their publication for the purpose of showing the high cost of unnecessary accuracy:

No. of Dimensions on One Piece	Probable Number of Perfect Pieces	Per Cent Estimated Increase in Ratio of Cost per Operation
1	100	0
2	90	30
3	50	75
4	15	100
5	5	200
6	0	500

In making the foregoing statements the author has in mind automatic and other machines where the close-dimension work is done at one setting and in manufacturing quantities. Some will dispute the figures given in the table and will declare that it is not good practice to attempt finishing pieces in the automatic, but that they should be roughed out there and finished on a shaving lathe or elsewhere. This brings us to our third fundamental and we may ask, Why should they not be finished complete when a good automatic must, in the nature of things, be (and is) as accurate as a single-purpose machine on a single accurate dimension? It is not accurate on several close ones, however, and accepted practice confirms this statement; and the reason why it is not and cannot be accurate is because of conflicting stresses.

The extent to which we may go in accuracy of interchangeability is often determined by the price that can be secured for the finished product. This is also true where the system of building rather than manufacturing is followed, and where a much better class of labor is necessary.

Unnecessarily Close Tolerances Often Specified

There are many firms the engineering departments of which really believe they are producing an interchangeable product of close dimensions, but their inspection and manufacturing departments could tell a different story. It is not bad workmanship or lax inspection that is responsible for their failure to produce such work, but the —ofttimes—unnecessarily close tolerances specified on unimportant dimensions, or the insistence of close ones on several dimensions of the same piece, and it is well to stop and consider what may happen, say, to a piece of apparatus after it has been in service for some time when initially it required the centers of two shafts to be held within one-half thousandth of an inch.

Interchangeable manufacture requires both relative tolerance and specific tolerance. Relative tolerance has to do with its relation to the part to which it assembles and does not necessarily affect the tolerance of the spe-

*Paper presented by Chester B. Lord, Battle Creek, Mich., at the spring meeting of the American Society of Mechanical Engineers, Chicago.

size dimension. Specific tolerance is that tolerance on a specific dimension required to render a particular part easy to manufacture, or to take care of the wear on tools. Any part increases in cost with each succeeding operation, and the probability of loss should decrease in the ratio of its added value. This result should be obtained, first, by a design having in view its relation to subsequent machining operations, and, second, through the proper sequence of operations relative to their difficulty, and sufficiently divided. This leads us up to the question of registration. Automobile-engine builders cast lugs on their cylinders to insure parallelism of bore; adding-machine and phonograph castings sometimes have bosses cast on, to take the pressure of milling or drilling operations. It is also true that sometimes we insert a pin in a drilled hole to guard against movement, but we do it only at times and usually as a matter of convenience, whereas it is a matter of necessity; and it will usually cost less to drill special holes or machine special lugs for registration and resetting than to attempt to do the work in fewer complex operations.

A Piece Under Stress Cannot Be Accurate

And nearly as important as registration is the question of clamping. One of the fundamentals laid down was that a machine under stress could not be accurate. This is just as true of a piece being machined, and unless a part is designed with its subsequent machining operations in view; unless it is supported sufficiently near its pressure centers; unless it has a three-point support with the holding or clamping pieces immediately over them (and in the case of a drill jig, independent of the part that carries the bushings), then that piece cannot be accurate. This is true of drilling always, of milling generally, and of turning sometimes.

How tolerances shall be indicated; whether they shall be identical, independent, or overlapping; what the law of probability and what actual trial demonstrate as the probability of overlapping or identical tolerances interfering; the percentage that may be expected at different parts of the tolerance, and the lessons to be learned therefrom are subjects calling for extended treatment by themselves. The same is true of inspection, of machining methods, of analysis of product.

The automatic screw machine will, of course, always be with us, for in that we meet ideal manufacturing conditions as nearly as they may be met. But the fact that the single-spindle screw machine persists and is even exclusive in the small-part field, is still further corroboration of the price we must pay for accuracy. The question of accuracy is of course relative, as is the question of rigidity of machine; but it is important in its bearing upon the cheapness of manufacture by determining the number of cuts, retapping, reaming, grinding, etc., that are necessary.

Quality does not depend upon the method under which work is done, but it is usual to assume that men working for day wages take more time and consequently turn out better work than those on a piece-work or premium basis. I believe people who reason thus are wrong in their psychology for the difference between the two methods does not in itself carry any incentive either to do better work or worse work. It is the remuneration received on the premium basis that gives the incentive; and where a premium does not work a wrong by inducing over-exertion, it lessens fatigue by increasing the workman's interest in his task; and as Taylor says, "Speed is a function of quality."

Commonsense in Interchangeable Manufacture

The law of compensation applies to mechanics as well as elsewhere in industry, and when we attempt to work to closer limits at the expense of increased operations, we must pay somehow. This is not to be considered as an argument against such a procedure, but an appeal for common sense in interchangeable manufacture—not to make the work easier, but to reduce the cost—and the firms that are really making a good interchangeable product are those that have analyzed all the different conditions and hold the extremely accurate dimensions at a minimum.

Neither should it be thought from what has been

said that close dimensions may not be necessary or desirable. Some companies require them much closer than do others. It then becomes a question of whether the price received for the finished apparatus is commensurate with the close limits imposed. If not, then it is a matter of increasing the tolerances so as to permit manufacture on a cheaper basis. In other words, the percentage of rejections that can be tolerated must be figured out and kept within that limit. For instance, on an apparatus costing \$10, for which a liberal price is asked and received, an allowance of 50 cents per apparatus for rejections may not be excessive. If, on the other hand, the price is close, 50 cents may mean the difference between profit and loss. This is a matter of policy to be settled by the administration and not by the shop, although we very often lose sight of this fact.

In the author's opinion there are no such things as close tolerances. All are relative and we only court trouble when we try to take too many steps at once. One-half thousandth is only five per cent of ten thousandths, and the chance of securing that accuracy in quality in one step is about five per cent multiplied by the extra cost. But one-half thousandth is fifty per cent of one thousandth and the probabilities are increased in the same ratio, so we may lay it down as a truism that subdivided operations are a function of accuracy.

Liberal Allowances Advocated

Analyzing our fundamentals, we find that there are three ways in which interchangeable parts may be secured: 1. By obtaining a percentage of good ones, with close tolerances; 2. by giving individual attention to each piece; 3. by employing liberal allowances.

The first is wasteful and the second is not manufacturing; the third one means liberal unnecessary allowances and close necessary ones, with the operations so divided that each individual working upon the part has but one thing to do. Thus, on a small shaft with six diameters all ground to a 0.0005-in. limit, there should be six roughing and six finishing operations because different wheels may be used; because less skilled men may be employed with less chance of scrap; because the wheel will be in better condition and will not need dressing so often and the operator will not have to change his sense of proportion, "hog off" material one moment and hardly touch it the next; because the finishing operations may always be done on the most accurate machine; and last, but not least, because as a rule one man can finish more work to close dimensions in four operations than four men can in one operation.

Let us not delude ourselves, however, that interchangeable manufacture or standardization is all profit and has no penalties. The French, even in large business, recoil from the idea of standardization, and this feeling has saved them through the ages from the rigidity of an arrested civilization. I am not competent to say whether the artistic qualities of the French are the result of their fight against standardization or whether it is the cause. Suffice it to say that no country that manufactures on the scale that France does and employs standardized methods, can either duplicate her excellence of manufacture or produce the artistic or scientific results she obtains. We must somehow pay for the repetition we call standardization, specialization, or interchangeability, and as usual the toll is collected from the intellectual.

Pump Associations Merged

WASHINGTON, Aug. 2.—Manufacturers of hydraulic and compressed air pumps at a conference last Wednesday with Secretary of Commerce Hoover, decided to consolidate the two associations representing the respective branches of the industry and to select a committee for the purpose of co-operating with the department in supplying statistics in order that the department may aid the industry in increasing foreign trade. Like representatives of other industries, the pump manufacturers intend to supply the department with vital statistics that are required to expand the foreign business.

A committee representing manufacturers of implements and vehicles has been formed and is co-operating with the Bureau of Standards in connection with work of standardization.

Mechanical Coal Trimmer

A mechanical coal trimmer that can be attached to any type of coal handling machine has recently been brought out by the Wellman-Seaver-Morgan Co., Cleveland, having been designed by A. F. Case, engineer of the coal and ore handling equipment department of that company. The first trimmer of this type has been installed at the coal handling plant recently completed by the Wellman-Seaver-Morgan Co. for the Western Maryland Railway Co. at Baltimore.

The coal trimmer consists of a rotating cowl and a pivoted frame carrying the trimming conveyor and driving motor. The cowl is divided into two sections, the upper of which is fixed to the lower end of the telescopic chute and forms a support for the lower or rotating section. This lower portion is in the form of an elbow which deflects the coal horizontally as it is discharged from the chute, giving it the proper direction to be handled by the trimmer belt. Rotation is accomplished by means of a motor, mounted on the upper section, driving a pinion which meshes with a rotating gear on the lower cowl.

The conveyor frame is pivoted to the upper front side of the rotating cowl and is arranged to swing about this pivot as desired. When the frame is fully extended, all of the coal leaving the cowl passes over the trimmer belt and is projected, by the high speed of the belt, in a horizontal direction into the portions of the ship's hold which are inaccessible to a gravity flow. When the frame is retracted the belt occupies a position at the rear of the cowl where it is not touched by the coal discharged from the cowl. The

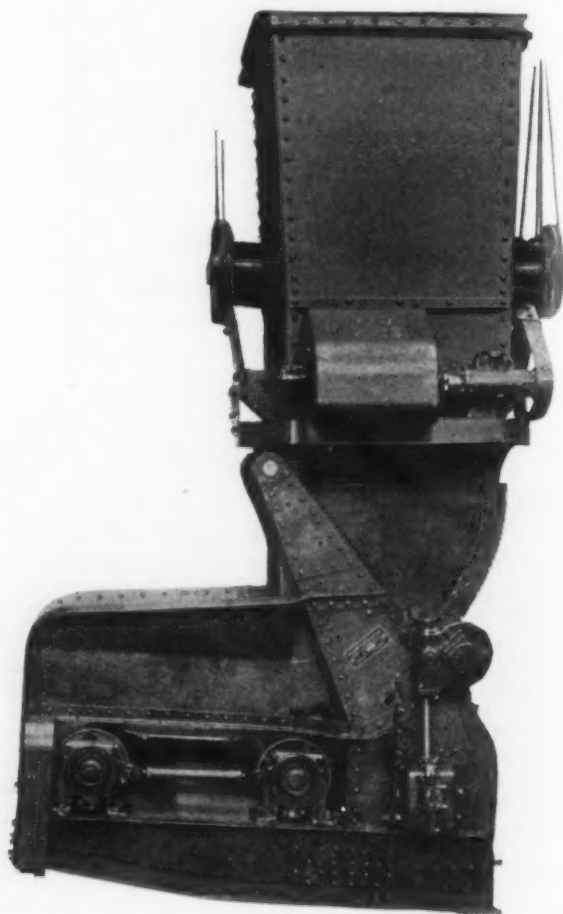


At Work in the Hatchway of a Ship, with Hatch Cover Showing at Right

trimmer belt can be easily and quickly moved to either position by power derived from the conveyor motor, through a selective reversing bevel gear and self locking worm gearing which drives two pinions meshing with gear segments attached to the cowl. A double throw hand lever on the side of the conveyor frame operates a jaw clutch to engage this drive and this clutch is automatically disengaged and thrown into neutral position at each limit of swing.

The trimming conveyor, approximately 4 ft. in length, is carried in the front part of the conveyor frame in proper position to receive the coal discharged from the cowl. This conveyor consists of fabric belting 36 in. wide and provided with protecting clips. It is carried on two steel pulleys supported in roller bearings connected to the conveyor frame. The bearings are adjustable and a takeup is provided on either side to keep the belt taut.

Power for driving the belt is applied to the rear



Side Elevation of the Coal Trimmer Shows the Essential Working Parts

pulley through a silent chain drive connected to the motor shaft. The motor is supported in a tight enclosure at the back of the conveyor frame. This motor box is provided with a hinged cover and made as tight as possible to exclude dust from the motor. The motor is of special construction provided with a ventilating attachment and has a rating of 50 hp. The chain drive is proportioned to give a belt speed of 2750 ft. per min.

On account of the severe service to which the belt is subject, frequent renewals are necessary, and in order to secure as long life as possible it is essential to eliminate all sources of weakness such as splices, etc. For this reason a continuous belt is used. The belt is made up in the required length and is slipped over the ends of the pulleys. One of the distinctive features in the design of this trimmer is the facility of endless belt renewals, accomplished by removing the bearings at one side of the trimmer, thus presenting the free ends of the pulleys over which the belt can be easily placed. Another feature is the guard plate which covers the return flight of the conveyor preventing coal dust from falling on the inside of the belt and passing between the belt and the pulleys, and causing rapid belt deterioration.

With this device it is possible to trim from 1000 to 1500 tons of coal per hour, when the material is delivered in a uniform volume to the trimmer. The distance to which the coal may be thrown will vary from 35 to 50 ft. according to the class of coal handled. It is stated that the trimmer will save the labor of from 150 to 200 men.

GOVERNMENT BUYING

Progress Made in Co-ordinating Control as Proposed by Director Dawes

WASHINGTON, Aug. 2.—Creation of a central co-ordinating control over Government purchases and the disposition of surplus property of the Government, brought about by an executive order of the President last Wednesday, was an expected development of plans devised by Director of the Budget Charles G. Dawes. The co-ordination is to be effected through the use of existing agencies, and while the control is general, special pressure will be directed at first toward the interdepartmental transfer of property which will prevent the departments from continuing purchases in the open market by one department where a surplus of the article in question exists in another. A partial list of those who will have charge of co-ordinated purchases and sales has been named. Col. H. C. Smither has been selected as chief co-ordinator of general supply. Those selected as co-ordinators on duty in areas include Maj. Joe R. McAndrews, Maj. T. W. Hammond, Lieut. Col. J. C. Rhea and Maj. D. A. Robinson. Officers of the Navy Department to be detailed will be announced later.

While it is doubtful whether it will have any sweeping effect either on Government purchases or sales of iron and steel, machinery, foundry supplies, etc., these products unquestionably will be purchased and sold by the Government on a more intelligent basis. Relatively, however, it is claimed that there has been but little overlapping in transactions of this nature. One of the best results of the order, it is believed, will be to establish more uniform practice as to bidding terms, requirement of bonds, etc., by manufacturers in these lines. The surplus iron and steel and machinery on hand has been inventoried with considerable thoroughness and requisitions made by departments wanting such material from others having it have not involved a great amount and probably will not. Because of this condition the quartermaster corps of the War Department has been authorized to dispose of surplus iron and steel which has been scheduled for sale in August, the tonnage being of a miscellaneous character and of a comparatively small amount. The greatest iron and steel surplus is held by the Shipping Board and is estimated at 300,000 tons, most of it being structural steel. While sales of this material have been held up pending completion of inventory, it is not thought any of it will be required by other departments, both because it is not of the kind or type other departments now need and also because it has been exposed to weather conditions to such an extent that it probably can be used for scrap purposes only.

While the necessity for using existing agencies to promptly meet the general situation, according to a statement by Mr. Dawes, requires for the co-ordinated control the detail to this duty of those already in different departments of the public service, this organization is independent of any department. Attention is called to the fact that the wording of the order must not create the impression that the War and Navy Departments are being placed in control of the organization, because of the fact that, for supply and purchase co-ordinating purposes, the country is divided along the lines of the present corps areas of the Army and some Army and Navy officers may be used in it. Experienced men, it is stated, will be selected, irrespective of the present departmental status.

The co-ordinating machinery set up does not interfere with existing departmental authority, save in the matter of co-ordination of action, which can be properly accomplished by executive order alone. Under the order there is set up the machinery to facilitate interdepartmental transfers of property. Negotiations between the departments as to price at which surplus material is transferred from one to another are rendered unnecessary by the authority given to the co-ordinating supply officers in the different corps areas to fix the price at which the bookkeeping entries incident to such transfer are made. This co-ordinating machinery will also be concerned in the systematizing

of Government purchases. By the establishment of this machinery, immediate relief to the existing situation is expected, and it will continue to function pending the study of the question of whether or not better machinery can be instituted through legislation. The Director of the Budget stated that its operation will provide an opportunity for the Executive and Congress to determine whether or not the purchase and surplus supply situation will be better handled by a central organization created by law, or by the continuance and improvement of this system, which is one of the co-ordination of existing agencies.

Under the terms of the order, the co-ordinators have broad powers in their respective areas and are required to see that no branch of the Government purchases property in the open market where it can be obtained from another department and to keep fully informed regarding material needs and supplies both in their respective areas and in the areas of other co-ordinators. They also will be required to confer with officials of every executive department having activities in their areas.

TAX LEGISLATION

Pressure to Push It Ahead of the Tariff and Other Measures

WASHINGTON, Aug. 2.—Pressure for quick passage of tax legislation and its precedence over tariff legislation is coming from business interests of the country with increasing force. Considerable sympathy for this view has been expressed in Congress, while the Administration, apparently feeling that it is a question for the legislative branch of the Government to decide, has not gone on record. There are some who favor the idea of combining tax and tariff legislation, among them being Representative John Q. Tilson of Connecticut. Chairman Fordney of the House Committee on Ways and Means, now considering tax legislation, estimates that it will require two weeks to draft a bill following the recommendations of treasury and internal revenue experts at executive sessions. Under this plan the measure would probably reach the House about the middle of the present month. It is uncertain how long the measure may remain in the House; but it probably will be only a short time, some members predicting its consideration will require only a few days.

One difficulty the House Committee on Ways and Means encountered at hearings, according to members, was the lack of concrete suggestions for substitute taxes to take the place of those it is maintained should be repealed or modified. As a result it appears likely that Administration recommendations will be used as the principal basis for legislation. These include the repeal of the excess profits tax, making up the deficit through a modified tax on corporate profits, or a flat additional income tax upon corporations; repeal of the existing \$2,000 exemption pertaining to corporations, to yield revenue estimated at from \$400,000,000 to \$500,000,000 annually; readjustment of the income tax rate to a maximum combined normal and surtax of 40 per cent, and the imposition of new taxes necessary to bring the total revenue up to \$4,000,000,000 annually; increase of the first class postage rate from 2c. to 3c. which Postmaster General Hays estimates would yield between \$75,000,000 and \$80,000,000 annually. Except for the latter feature the proposals follow to a large extent those embodied in a bill introduced early during the present session by Representative Longworth of Ohio.

Suggestions of the National Association of Manufacturers for the adoption of a sales tax as a substitute for war excise taxes apparently have not met with much favor at the hands of the House Committee. The committee refused to admit testimony dealing with the sales tax under the claim that it is not germane to present plans. Secretary of the Treasury Mellon declined to endorse the proposition and Secretary of Commerce Hoover was non-committal. The indications are, therefore, that the sales tax will not be considered in the new measure. James A. Emery, general counsel of the association, told Secretary Hoover, as he later

told the committee, that one-third of the income of corporate business is paid in State and National taxes and that the excise taxes, excess-profits taxes and other special taxes make it impossible for business to forecast definitely what costs are going to be. He insisted that under a non-discriminatory sales tax, properly administered, business would not be confronted with the uncertainties of the present system and could figure its cost of taxation accurately. J. Philip Bird, general manager of the association, expressed a similar view at the conference between the association and officials of the Bureau of Census last Friday.

W. H. Stackhouse of Springfield, Ohio, president of the National Implement and Vehicle Manufacturers' Association, in appearing before the committee, urged repeal of all excise taxes and of all surtaxes to the 20 per cent group and the funding of the entire war debt for a period of 50 to 75 years. His alternative was a sales tax. E. F. McGrady, for the American Federation of Labor, presented a resolution adopted at the Denver convention in favor of retaining the excess profits and income taxes. The Chamber of Commerce of the United States has urged a general turnover tax on all business transactions, repeal of the excess profits tax and war excise taxes, both those on transportation and communications and those levied in relation to particular business.

Should it be concluded to enact tax legislation before the Senate receives the tariff bill, it is believed by some that Congress would take a recess after the new internal revenue law had been enacted and take up the tariff bill immediately after convening.

PLANNING THE CENSUS

Secretary Hoover Expects to Effect Saving by Cutting Out Dead Wood

WASHINGTON, Aug. 2.—Plans for cooperation between the Bureau of the Census, Department of Commerce, and the National Association of Manufacturers and its members, in compiling the 1921 biennial census were made at a conference here last Friday. Proposals to simplify and expedite the work and to save money were especially emphasized and a committee was selected to bring this about. It is the desire of the bureau officials and the association to determine what possibilities of simplification can be developed in the census schedules for 1921, which raised the question as to the scope of the undertaking. The first point involves the scope of the establishments to be considered and the need of limiting it. For example, it was pointed out that the iron and steel schedule of 1919 regarded a manufacturing establishment as an institution employing five or more persons producing material valued at \$500 or more annually. On this basis there were 285,000 establishments of all kinds included in the schedule. In 1914 only 4.7 per cent of the value of products was produced in establishments whose individual output was valued at less than \$20,000. It is contemplated for the 1921 census to include only establishments whose products have an annual value of \$25,000 and more and to approximate values below that figure, based on past figures, which was held to be a logical plan in view of the fact that it was shown that 35 per cent of the plants have an annual production of less than \$100,000 each. It also will be the purpose to set forth only essential facts.

Another object of the conference was the linking of the National Association of Manufacturers and the particular industries with the Department of Commerce in order to supply information to be carried in the monthly survey of business conditions. This has a bearing on the census figures as shown by the statement of Secretary of Commerce Herbert Hoover, who, in addressing the conference, said governmental statistics on industrial production will be gathered in the 1921 biennial industrial census on a commodity basis. He asked for and was promised cooperation. Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce, explained the commodity relation of the new industrial divisions of the bureau to business and trade associations. With the bureau reorganized on

a commodity basis, he stated that *Commerce Reports*, the official publication of the Department of Commerce, soon will be issued weekly instead of daily, as at present, and information will be carried under commodity heads in accordance with the new industrial divisions created and being established. The iron and steel division was the first one organized with Walter S. Tower in charge, while the heavy machinery division was the third one to be established, with Walter H. Rastall in charge. The work of preparing information for publication under commodity heads will be under the direction of the heads of the industrial divisions.

Secretary Hoover said that proper and accurate statistical information would be vital equally to the Government in determinations of policy and to industry itself in its daily necessity of ascertaining the economic trend.

"These statistics hitherto have been secured in terms of money," Mr. Hoover stated. "I think we all realize now how uncertain and indeterminate monetary values can be, and therefore we have decided to place it next year on a commodity unit basis, as well as monetary."

"We want to get these facts without plaguing industries, and we also want to get it in a form that will be of practical utility to the industry when it is obtained. Thus, nobody but the manufacturers can tell us in what form to proceed."

The secretary said that about \$23,000,000 had been provided for expenditures of the Department of Commerce this year and that it was planned to "save between \$2,000,000 and \$2,500,000 of it by elimination of dead wood and elimination of services," but that notwithstanding it was intended to spend extra money in the study and promotion of foreign trade and the manufacturing census.

J. Philip Bird, general manager of the National Association of Manufacturers, presided at the conference.

INDEPENDENTS EXCLUDED

Steel Corporation Alone Will Respond to Pittsburgh Base Complaint

WASHINGTON, Aug. 2.—The Federal Trade Commission has decided to center its attack in the Pittsburgh base case upon the United States Steel Corporation exclusively. This fact has been made evident by the refusal of the commission to grant requests of independent steel companies to intervene. The attitude of the commission has been a source of surprise. The presumption has been that it was desired to obtain all the information possible concerning the case, but it is pointed out that this cannot be done if the independents are not privileged to present their views which necessarily take a form of their own. The contention is made that the great majority of the independent steel companies operate only in a single district and that in such cases their entire output, when produced outside of the Pittsburgh district, would be affected by a change of practice, save in those instances where material is invoiced at flat prices. Even in the case of the latter it is desired to maintain the present custom as a sound business principle.

During all previous hearings, the commission accepted testimony from independent steel companies, but its complaint was directed against the Steel Corporation only. It was not believed, however, that this meant that the independents would be denied the right to intervene, and refusal to permit such intervention has been vigorously resented. The commission apparently is of the opinion that it will simplify the case and strengthen its own position by concentrating the attack on the Steel Corporation solely. The hearings, according to plans, will begin early in September.

Commissioners of Allegheny County, Pa., have voted to submit to the voters on primary election day, Sept. 20, a bond issue of about \$38,000,000 to be used for new roads, new bridges, the raising of old ones, for a new building at Ross and Diamond streets, Pittsburgh, and the remodeling of the old county courthouse.

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ESTABLISHED 1855

THE IRON AGE

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Why High Duties on Manganese?

In the recent debate on the tariff bill in the House a Congressman asked Chairman Tilson, of the sub-committee in charge of the metal schedule, why his committee had recommended the high duty provided for ferromanganese. The reply was that Chairman Tilson had opposed the duty of 2.2 cents per pound of contained manganese, but that it had been adopted against his vote. The Congressman who inquired said he had received many protests against the ferromanganese duty. These protests will go also to the Finance Committee of the Senate and it already appears that various members of the House who voted for the bill will not oppose reductions the Senate may make in the ferroalloy paragraph when the final try-out comes.

We have called attention already to the high rate of duty imposed on manganese ore. To-day a ton of foreign manganese ore can be bought, f.o.b. Atlantic port, at 22 cents per unit of contained manganese. That would mean, for a 50 per cent ore, \$11.20 per ton duty, or slightly over 100 per cent on the sum of the foreign price, the ocean freight and insurance. For a mineral, which in mining and handling cost is comparable with iron ore, such a rate is so high as to call for a full statement of the reasons which led to its imposition.

Figuring that it takes 2.2 tons of a 50 per cent manganese ore to produce a ton of 80 per cent ferromanganese, the duty on that amount of ore, under the bill, would be \$24.64. The interest of the domestic producer of manganese ore was apparently the controlling factor in the drafting of the manganese rates. The producer of ferromanganese, with all his investment in blast furnace property, which is subject to greater depreciation than that devoted to pig iron, turning out a product that on to-day's market is six or seven times as valuable as manganese ore, ton for ton, has only about 60 per cent as much protection on his operations as the bill gives to the ore entering into a ton of ferromanganese. In other words, the duty on a ton of 80 per cent ferromanganese is \$39.42, under the Fordney bill, and the duty on the ore necessary to produce a ton of 80 per cent ferromanganese (assuming 50 per cent ore to be

used) is \$24.64. The protection to the ferromanganese maker is thus \$14.78.

Assuming 16 pounds of 80 per cent ferromanganese to a ton of steel ingots, the duty of \$39.42 on a ton of imported ferromanganese would mean 28.15 cents per ton of steel ingots. As the finished steel yield is roughly 75 per cent of the ingot output, the 28.15 cents on a ton of ingots becomes about 37.5 cents on a ton of finished steel. That is the handicap, in other words, which the Fordney bill imposes on a ton of American finished steel going into the export trade, as compared with the present condition of free manganese ore and free ferromanganese.

It is hard to believe that the facts concerning manganese ore supply and the status of American manganese mining and ferromanganese production were seen by the Ways and Means Committee in their right light. The manganese problem is not free from complications. It would require a voluminous pamphlet to present the facts fully. The Tariff Commission did well in putting them in permanent form, even though the import of this well-digested information was not grasped by the framers of the pending bill. From another pamphlet, which argues the question from the standpoint of American users of ferromanganese, we present extracts on another page. The pivotal fact in the situation as there emphasized is that high-grade manganese ores exist in the United States in scarcely more than negligible quantities, compared with the requirements of our steel industry. Alongside that fact stands another significant one—that the one considerable twelve-months' output of domestic ores, that of 1918, required for its stimulus ferromanganese prices six to ten times those prevailing before the war.

Sufficient reasons have not yet been given for imposing a new burden of 37.5 cents on every ton of finished steel exported by independent steel manufacturers. To maintain a weak manganese mining industry at home our steel manufacturers are asked to pay millions of dollars annually on the imported manganese ores that must continue to come from abroad. And that annual outlay would tend, not to the development of a native manganese supply against the next war, but rather

to the exhaustion of the domestic reserves, such as they are, with the alternative of entire dependence on foreign mines when the country again faces a national crisis.

The Subnormal Steel Demand

The most important fact in the steel market situation at present is that of late the demand upon the mills has been below a normal relation with the general business or industrial activity of the country. Some reference to this fact was made in THE IRON AGE, July 21, page 149, a comparison being given showing relative activity in iron and steel and in several other industries.

The production of steel recently dropped to about 20 per cent of capacity, or about 25 per cent of the rate maintained during the greater part of last year. The rate in tonnage was about 30 per cent of the rate from July 1, 1912, to July 1, 1913, in which period the pre-war record in freight ton-mileage was made. Of late, however, the freight movement on the railroads has been only a few per cent less than in that period, while steel production is about 70 per cent less. Debits to individual accounts at banks, which the Federal Reserve Board itself says "are indicators of the volume of the nation's business" have been running only 20 or 30 per cent less than those of a year ago.

These comparisons do not prove that the production of steel lately has been at a rate less than is requisite for the country to continue indefinitely its present industrial activity, but they are strongly suggestive. It is true that if one take conditions such as obtained in the United States in 1906 and eliminate construction work the steel industry would suffer a larger percentage of loss than would business or industry in general, but there is some construction work, regarded as absolutely necessary, going on now and other work in immediate prospect, and the quantity of steel required to keep the country going, without any construction, is large.

The flow of steel from mill has been held back by the existence of stocks of steel in the hands of jobbers and manufacturing consumers, the existence of stocks of manufactured wares in the hands of manufacturers and wholesale and retail dealers and the persistence in use of old machinery, implements, tools, etc., which in normal conditions would be replaced with more freedom than has lately been exhibited. The stocks are being liquidated, the things in use are wearing out, and eventually they must be replaced. The demand upon the mills has undoubtedly been below a normal relation to the general activity of the country of late, and is bound eventually to return to a normal relation, such improvement being entirely apart from what may come at one time or another by betterment in business activity generally and the development of more favorable conditions for construction work of a strictly investment character.

That the country is not loaded with wares made from steel is a reasonable assumption. There was much extravagance in 1920, but there was no particular evidence of extravagance in the pur-

chase of things made of steel. Much has been said about extravagance in buying automobiles, but there has been buying of automobiles in the past few weeks. Carpenters did not throw away all their old tools and buy new ones. Over a year ago the National Hardware Association issued an extensive compilation showing percentages of price advances, Jan. 1, 1915, to June 1, 1920. Carpenter's augers were at three and a third prices, common braces at four prices and planes at three prices. Many comparisons could be made, suggesting the improbability that the ordinary everyday consumers of wares made from steel bought in such a way that they will not have requirements in future.

The matter of the buying power of the people being reduced is not involved in this issue, for the point is that demand upon the steel mills should return to a proper relation with the buying power that exists, as employment and earnings stand to-day. Before the war the steel industry felt that the minimum requirements of the country, even in a period of depression, represented about 50 or 60 per cent of the productive capacity, and the dictum rested upon experience rather than theory. A 20 or 25 per cent demand was unthinkable and has been brought about by unprecedented conditions. It could not last for any length of time with the country as a whole running as it now is.

German Metal Industries Active

The Berlin correspondent of the New York Times, discussing the marked revival in German industry, cites the fact that German manufacturers can secure all the American cotton and copper they need at rock bottom prices. He quotes a leader in the German electrical industry as saying that exports of brass and copper tubes for Russian locomotive repairs have been heavy and that Germany is getting all its copper from America at "cost-of-production price." Recent export statistics bear out this statement as to Germany's activity in the American copper market. Whereas in 1919 Germany bought no American copper and in 1920 was third in the list of foreign buyers, for the eleven months ended with May that country had bought more of our copper than any other, taking over 27 per cent of the total exports. Of the total purchases of the 11 months nearly 72 per cent was bought in 1921, or from January to May inclusive. Germany's recent purchases are not far short of her 33 per cent of the total in 1913 when she was preparing for war. The significance of this movement is not light; it is clearly indicative of a revival of industry in that country which means much to the world in many ways. Concerning the German iron industry, late reports are that it is "going strong, the mills having orders sufficient to keep them busy until the first of the year."

Not in many years have British imports of iron ore been at so low a rate as at present. Against a monthly average in 1913 of 620,100 tons, iron ore imports for the first half of 1921 were only 214,028 tons per month, while May and June had

less than 25,000 tons each. During the war the ore imports did not reach the 1913 figures, nor were the latter equaled in 1920. Spain has always contributed by far the greater part of Great Britain's foreign supply of iron ore, the imports from that country in 1920 having been about 70 per cent of the total. Sweden, which formerly stood second on the list, is now quite outranked by Algeria. The slump in ore demand not only means much to the exporting countries, but is an index of the very low ebb of the British iron industry.

Prospects for Building

The cost of building has lagged conspicuously on the road toward a level comparable with pre-war conditions. Railroad freight rates have not even started. Coal has had a great decline, but presents the spectacle of profits being absent while prices are still relatively high. In the three cases the influence of labor unions is seen, and indeed if the unions in these three lines of activity are deducted there is not much left of labor unionism. The three cases are different. Coal mining wages are extremely high, relative to other things, largely through the accident of there being a wage scale signed to April 1 of next year. The railroad wage situation is gradually being worked out. In the building trades there has been some introduction of the open shop principle and there have been some adjustments by agreement with labor unions, slightly reducing wages and improving working conditions.

On the whole, however, the cost of building is conspicuously high when compared with wage rates in general or commodity prices in general. There are a number of reasons, some of them being rather well concealed. In some districts there is too much co-operation between contractors and unions of building trades artisans to produce the competition the public expects when it proposes to pay out money. There has been work in progress that the builders could not afford to delay for the purpose of conducting a contest. Wage rates had gotten so extremely high that compromises presenting the appearance of involving materials concessions left rates very high still.

While forces are at work that will undoubtedly bring about a proper adjustment in time in the cost of building the adjustment seems to lag. The lagging can be understood better by consideration of the attitude or position of those who build or might build. A common tendency is to consider building construction as a simple thing, like bread or coal. Nearly all bread is produced for consumption to sustain human life, while nearly all coal is produced for the single purpose of burning to produce heat. Building construction on the other hand, represents a wide variety of purposes and there is a wide variety in the attitudes of the builders toward the work. This complexity in construction demand accounts for the slowness in the readjustment of building costs, when from a narrow viewpoint it might appear that the readjustment could be forced very quickly by a "strike of buyers."

The character of the occasion for considering a building project ranges all the way from a mere

notion to an absolute necessity. A man who lives in his house and owns a vacant lot adjoining may feel in the morning that he would rather like to put up a better house on the lot and live in it, while in the evening he may feel that he does not want to bother. At the other end of the list may be a storekeeper who sees that he is missing trade that would come to him voluntarily if he would merely enlarge his store. Some students have endeavored to classify by calling some building "necessary" and some "optional." The terms are not adequate, of course, but they bring out the antithesis.

This correct conception of the variations in character of demand or desire in connection with building was ignored by those who last year were shouting that the country "needed" a certain number of homes, some putting the number in the hundreds of thousands and others setting it at a million or one and a half millions. The obvious fact is that some men will indulge in building construction no matter what the cost, some will be encouraged to embark by declines in cost of one percentage or another, some, particularly those whose incomes have been greatly reduced, have been reducing what may be called their bids faster than the offers have declined, while others will require extremely favorable conditions before they will even think of building. They must have a real bargain. Building costs will presumably decline from time to time as it becomes necessary to pick up one class after another. The call for building, or what may be called by the generic term of "demand," ranges all the way from absolute necessity down to a mere whim, and the building market will cater to as much of the demand as it needs.

Our Half-Yearly Index

The index of THE IRON AGE for the half year January to June, 1921, inclusive, has been compiled and printed and is now ready for distribution. It will be forwarded promptly to those who have entered their names on our list as desiring it. Others who may have use for copies can obtain them by addressing our Circulation Department.

Brazilian Iron and Steel Production

The production of pig iron in Brazil is about 15,000 tons per year, the Esperanca Works, in Minas Geraes, being the only producer, according to the London *Iron-monger*. There are two electric furnaces in operation in San Paulo, one making steel and the other producing iron castings. The Companhia Electro-Metallurgica Brasileira by the end of the year will have in operation at Ribeirao Preto a steel-rolling mill. The Anglo-Brazilian Iron and Steel Syndicate also intends to erect not far from the city of Rio de Janeiro iron and steel works.

To Guarantee Belting on a Mileage Basis

Selling leather belting on the basis of mileage has been determined on by the Olmstead-Flint Co., Cambridge, Mass. As the company expresses it, it is taking a leaf from the book of the tire manufacturers, and it plans to guarantee the service of two of its brands of leather belting, Pacemaker and Oilskin. The guarantee has been established at 250,000 miles, to be determined from the belt speed and the number of hours of use.

CORRESPONDENCE

Who Made Swords for the Generals of the American Revolution?

To the Editor: Where and by whom were the swords manufactured which the American officers carried during the French and Indian war and during the American Revolution, a period approximately 1750 to 1780?

I have run through the pages of most of our standard histories, searched the libraries in our largest cities, the museums and historical societies, and consulted our own American authority on arms and armor—Bashford Dean of the Metropolitan Museum of Art, New York; Charles Foulks, curator of the armories, Tower of London, England; the State Department and the historical branch of the War Department at Washington; and that great institution founded for the purpose of disseminating knowledge and yearly costing us in upkeep approximately \$750,000—the Smithsonian Institution—the U. S. National Museum, Washington, D. C., with its cases and cases of swords, arms and uniforms, could not tell me where or by whom those swords on exhibition, carried by the American officers during the above mentioned period, were made.

I wish this information to designate and locate more particularly the maker of an old sword on whose blunt edge, near the hilt, are stamped into the metal these initials:

J T & Co

I read these as "J. T. & Co.," or, being old type script, they might be "I. T. & G."

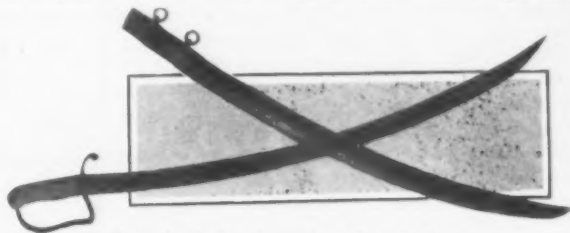
The legend in connection with this sword is that it was carried through the French and Indian war in Vermont and later by the same general through the American Revolution with the Green Mountain boys. I have promised this sword to a historical society in New England, in the little town where the general who carried it lived, and I desire to give at the presentation something of its technology of manufacture. I know that some 24 of General Washington's associate officers were from the furnace and forge, but I am unable to link any of them with actual sword making or to find any of their names which fit to the initials stamped in my blade. The Sterling Iron Works at Chester, N. Y., where the great chain was made, was succeeded by Peter Townsend and later by James Townsend & Co. John Taylor, of Sarum, Pa., the famous nail maker of the colonies, whose nails "rattled" through the halls of Parliament, also had a forge and furnace. Both of these names might fit the initials on my sword, if I could connect them with sword making.

One of the five swords of General Washington was made by J. Bailey, Fishkill, N. Y., where the Continental Army supplies were stored. His name does not fit the initials and I do not associate him with sword making apart from this particular one which undoubtedly was in the beginning a presentation sword. The Ames Sword Co., Chicopee Falls, Mass., reputed the oldest sword maker in the country, could not answer my inquiry and from Victor Clark, editor of the *Living Age*, Boston, an authority on early American industries, I learn that the blister steel made at the Sterling Works probably did not find its way into important weapons of that date, and he is of the opinion that sword blades of that period were of English make.

I enclose a picture of the sword, together with some rough pencil sketches of the four gold etchings on the blade. The steel of this blade is blue annealed and in its day it undoubtedly was a bright and shining

weapon. I am of the opinion that you or some one connected with your well known publication, may be familiar with some of the smaller artisans of that period, who may have made swords and whose name might fit the stamped initials on my blade.

The sword of Commodore Oliver H. Perry used in the battle on Lake Erie, 1813, is similar in shape and



Sword of the American Revolution

design and mounting. It was made by Capt. David Dobbins of Erie, Pa., in 1812.

Likewise, the sword of John Brown, found between the mattresses of his cot in prison at Harper's Ferry, was similar in size, shape and etchings, but bears no maker's marks. This sword is now in possession of the Chicago Historical Society, Chicago. None of the present owners of these similar swords knew of other earlier makers of swords.

EDWIN R. BURDICK.

Kalamazoo, Mich., July 20, 1921.

Electric Melting of Cast Iron Scrap

To the Editor: THE IRON AGE of June 23, photographs and particulars are given of tests run at Alliance, Ohio, on a resistance type of furnace in which the heat is generated in troughs lying over the charge, reflected on to the roof and from the roof to the charge. The furnace was used for melting cast iron borings and the article states that this is an application in a new field.



Gold Etchings on the Sword Blade

I should like to state that quite a number of electric furnaces have been operating with success for some time on the melting of cast iron borings. We have had Greaves-Etchells arc resistance type of electric furnaces doing this work for the past four years.

While the tests made at Alliance are not a new application, there is undoubtedly a very large and fertile field for the electric furnace as applied to the melting or refining* of cast iron. The present cupola iron is made almost identically with that from even pre-historic times. The type and design of furnace have been changed little if any in centuries, and the ancients often had a crude device of leather bellows for forcing an air draft through the cupola. The chief trouble with cupola iron has always been that impurities are increased rather than decreased by the process.

A paragraph appeared in THE IRON AGE, Jan. 6, on a 1-ton Greaves-Etchells furnace installed at the

Holmes Foundry Co., Port Huron, Mich. Unfortunately a printer's error occurred in giving the sulphur content in the hot metal from the cupola. This should have been 0.102 per cent, not 0.012 per cent as stated. This hot cupola iron containing 0.102 per cent of sulphur was put into the electric furnace and in 40 minutes the sulphur was reduced to 0.023 per cent. On a cold charge consisting of cylinder scrap and iron borings, which was melted down and poured in 65 min., the sulphur in the final product was reduced to 0.013 per cent. The time and the sulphur reduction compare most favorably with the 6 hr. and 10 min. taken at Alliance with a hot furnace where the sulphur increased from 0.021 per cent in material charged to 0.047 per cent in the finished charge.

In connection with this melting or refining of iron borings, it is very important to take into consideration the design and proper application of electric heat. In the Alliance tests, the furnace used was one in which the heat is generated in a trough containing granular resistance carbon and this trough is suspended over the bath. The heat goes first up to the roof and then is reflected down on to the charge. The figures given would show that 657 kw. hr. of energy were used to bring 1500 lb. of pig iron to a pouring temperature; 317 lb. and 325 lb. of iron borings were added later. Apparently on the kilowatt hours used for melting the 642 lb. of borings in a 1500-lb. bath of metal already molten, figures were calculated based on the energy put into the furnace after the small quantity of borings was added and it was assumed that by increasing the kilowatt hours correspondingly a larger weight of cold borings could have been melted at the same rate. This is by no means correct, as an increase in the weight of cold scrap added to the molten bath would probably have doubled the kilowatt-hour consumption.

The point that I wish to bring out is that the type of furnace which was suitable for the lower temperatures of brass and non-ferrous melting is not at all suitable for the high temperatures required for melting or refining iron. Heat reflected to a furnace roof and from there to the charge cannot be as economical as a direct arc playing on the charge. The temperatures required are too high and at these high temperatures the life of the granular resistance elements and the refractories as used in the furnace at Alliance will suffer severely.

The simplest and the obvious way of melting cast iron borings, and one we have consistently advocated, is a direct application of the arc to the charge either by a 3-ton electrode type of furnace or the Greaves-Etchells type, where two phases of the three-phase supply are attached to the top electrodes and the third phase to the furnace hearth.

One of the most important features in connection with the melting or refining of iron borings is the reduction of sulphur. This increased instead of decreased in the Alliance test. The simple, direct arc type of furnace also occupies considerably less foundry space than the furnace illustrated in your recent article.

FRANK HODSON, President,
Electric Furnace Construction Co.

Philadelphia.

[*It should be stated that the article referred to by Mr. Hodson did not claim any refining efficiency, but was a suggestion regarding melting scrap iron only.—EDITOR.]

"The Man at the Fire" and Others

To the Editor: We were surprised to note in the leading editorial, "Now He Is Bossing Dad," of the July 13 issue of *Chemical and Metallurgical Engineering*, an agitated criticism of our recent advertisement, which appeared on the front cover of THE IRON AGE in the form of the poem, "The Man at the Fire."

We are sorry to have been responsible for any censure your publication may have suffered from our illustrious and esteemed friends of *Chemical and Metallurgical Engineering*, but at the same time we are amused at and pleased with the results of our advertising effort.

We believe if the poem had been carefully studied the editorial criticism would never have been written, because the poem warns against "rule of thumb" methods.

Fortunately our position in the metallurgical field is so sound, viewed from the standpoint of progressiveness in either manufacturing or heat treating methods, that we cannot take seriously the conclusion of the editorial as contained in the four points—a, b, c and d.

We are proud of the fact that one of our officials is a poet as well as an expert maker of fine steel. The criticism has inspired further effort and our opinion of and answer to the editorial can be best expressed as follows:

The Practical Man or the Technical Man—
Which has the right to boast
That he is the one that brings success,
That Industry needs him most?

The driving wheel or the steering wheel,
Ignition or carbureter,
Which is the most essential part?
Which would you call the better?

Airman, gunner or engineer—
Which do you think did more?
General Staff or infantryman—
Who was it "won the war"?

If by a chance you had the power
To fashion yourself again,
Would you omit your arms and legs
And put in an extra brain?

Then let us forget this foolish talk
Of "whom do we most require";
Why—the Technical Man and the Clerical Man
And the Practical "Man at the Fire"!

FIRTH-STERLING STEEL CO.,

Roy H. Davis, General Manager.

Pittsburgh, July 29, 1921.

Census Bureau Will Issue Price Bulletins

WASHINGTON, Aug. 2.—Following the announced greater activity of the Department of Commerce in the economic-statistical field, the Bureau of the Census is preparing to issue at once a monthly compilation of building material prices, along with those on other commodities. The building items will number about 25, upon which it is proposed to secure prices. Among the products to be included are nails, pipe, reinforcing steel bars, structural steel, lumber, cement, etc. Price information is to be obtained from builders' exchanges throughout the country. The figures will represent prices paid on the first of each month by contractors delivered at a local distributing point, such as car, siding, pier, yard, or warehouse.

Farm Implements Manufactured in 1920

Gas tractors stand far above all other items of farm implements in value produced last year. According to a bulletin of the Department of Agriculture, there were 203,207 tractors made by 90 firms, the aggregate value being reported at \$193,563,000, or an average of \$953 each. Four-fifths of these were sold in the United States; 29,143 were exported and about 11,000 added to stocks. Other articles, under the same heading of farm equipment, which were made in 1920, are shown in the following table:

Manufacture of Farm Equipment in 1920				
Implements	No. of Firms	No. Manufactured	Total Value	Average per Unit
Gasoline tractors....	90	203,207	\$193,563,000	\$953
Steam traction engines	15	1,766	4,661,000	2,639
Plows and listers....	79	1,361,578	43,222,000	32
Tillage implements...	92	.....	22,919,000	..
Planting machinery...	84	472,248	20,097,000	43
Cultivating machinery	61	580,179	15,186,000	26
Haying machinery...	29	411,556	24,703,000	60
Harvesting machinery	53	232,177	41,015,000	177
Machines for preparing crops for market or use.....	128	196,772	35,612,000	181
Horse-drawn vehicles.	85	449,095	42,423,000	94
Other items .....	..	.....	93,544,000	..
Total	583	.....	\$536,945,000	.....

It will be noted that the total value produced was \$536,945,000, of which \$471,442,000 represent the value of domestic sales, while sales for export account for \$78,614,000.

In a recent interview at Youngstown, Ohio, H. Koppers, maker of by-product coke ovens, expressed the belief that Germany will get back to normal as soon if not sooner than France or England. The fact that Germany is not hampered by upkeep of extensive armament is assisting materially in her industrial rehabilitation, it was stated.

TARIFF BILL PLANS

Decision as to American Valuation May Have Important Effect on Rates

BY L. W. MOFFETT

WASHINGTON, Aug. 2.—Recognizing that determination of its policy on the American valuation basis for assessing duties is the first essential to framing a tariff bill, the Senate Committee on Finance will go into executive session on Thursday of the present week to reach an agreement on the subject. This system of fixing ad valorem rates has been the source of widespread differences which have been presented to the committee since it began its hearings, and the question plainly is one which underlies the entire matter of arriving at duties to be carried. In the event the American valuation as passed by the House is adopted, it is known that there will be a general revision downward of rates throughout the bill. Should the American valuation plan be eliminated, prominent members of the committee, some of whom are not attracted by the plan, contend that the whole bill will have to be worked over as to administrative and other features and that hearings will be more extended than was originally planned. Because of the desire to close the hearings as early as possible and to get the legislation enacted, they apparently are ready to adopt the plan as it passed the House or to accept it in a modified form.

Compromise Plan

A probability of the latter alternative being decided upon is seen in the fact that the Treasury Department has prepared a tentative draft for the committee which is said to follow the lines suggested by George C. Davis, in charge of the comparative value report bureau, customs division, Treasury Department, in New York. He opposed the plan carried in the House bill on the ground that it would be difficult of administration and that it would also be difficult to adjust the rates to meet the new plan. His idea is to have the American producer prove the comparability of his article with that which is imported and in competition with the domestic product. Where the comparability was shown, the imported product would be appraised at the domestic price, but not the gross, and taken out of the domestic price would be the rate of domestic transportation, the bringing of the merchandise to the United States, and a reasonable profit and expense, not to exceed 8 per cent. This is explained as building from the American selling price of the domestic article a fair and constructive foreign market value to be applied to the imported articles that are directly comparable to the American-made article. In instances where the interested party comes to some one, preferably the Secretary of the Treasury, Mr. Davis told the committee, and proves the comparability, the secretary could proclaim the article, and all such articles coming from foreign countries would be appraised on those articles. As to the remainder, where none can be appraised, the duty would be assessed at the foreign market value.

Wide Difference of Opinion

The variance among Government officials regarding the plan was shown by the testimony of Chairman Thomas W. Page of the Tariff Commission, who opposed it, and of two other members of that body, William S. Culbertson and William Burgess, who favored it. Mr. Walker was of the opinion that the plan "will cause confusion in the customs laws, will make foreign business highly speculative and add another element of uncertainty to a business situation already chaotic." He thought, however, that the plan could be administered successfully "ultimately." Mr. Culbertson said

that the plan "has become important at the present time because of the very disturbed economic conditions in foreign countries, and I feel, personally, that it will tend to help meet the very unusual conditions which you are confronted with today." Mr. Burgess said that "the advantages of the American valuation plan so far outweigh the difficulties as to make the latter seem insignificant." Domestic interests strongly urged the adoption of the plan, while importing interests are strongly opposed to it.

The plan has found strength in the fact that, aside from the proposal of Mr. Davis, no satisfactory substitute has been offered for it, and it is generally conceded that it would be a difficult problem to fix ad valorem duties on the existing foreign market valuation system with an idea of protection in mind.

The Metal Schedule

The American valuation plan could be applied to the metal schedule without any difficulty, it has been stated by members of the committee, because of "comparability" and "competitive" nature of the products carried in it. Moreover, the plan would not apply to the greater number of the metal products because of the specific duties applying. But the question of determining a policy as to the plan is vital to all schedules because of the effect it will have on rates. It appears to be a foregone conclusion that ad valorem rates in the metal as well as in other schedules will be reduced by the Senate Committee if the American valuation plan incorporated in the House bill is adopted. At least that is plainly the intention of leading Republican members of the committee, and it goes without saying that lowering of rates would be acceptable to the Democratic members. Whether specific rates may be lowered apparently is to be determined.

The committee will continue hearings over to-morrow, after hearing witnesses on the American valuation plan and on the chemical schedule, and after determining its policy at executive session, to be held Thursday, will resume hearings on the schedules. It is not possible to say when the metal schedule will be reached, but the committee is expediting the hearings, and it is assumed the iron and steel producers will be given an opportunity to be heard soon. The committee is accepting briefs and statements, and it is said that a number have been filed by iron and steel interests, with attacks on House duties on ferroalloys as a notable feature.

Hot mills of the N. & G. Taylor Co., Cumberland, Md., which have been idle since June 30, were started up July 25.

The Iron Age and Its Readers

The Composite Price shown week by week following our "Comparison of Prices" table (appearing this week on page 293) is the average of the prices of the seven principal forms of finished steel.

Steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets, the seven products whose prices enter into the composite, constituted 88 per cent of the country's output of finished steel in each of the past two years. They are the forms of finished steel most commonly thought of in gauging consumption or market prices at a given time. In the 10 years preceding the war the average of the weekly quotations on these seven products was 1.684c. per lb. This week the Composite Price is 2.364c. per lb. or 40 per cent above the 10-year pre-war average.

IRON OUTPUT VERY LOW

July Production 7605 Tons Per Day Less Than in June

Down Close to 1903 Record—Net Loss of Seven Furnaces

A new low record for many years was made in July for the output of the blast furnaces of the country. According to the data gathered by telegraph, the pig iron output last month was close to the lowest record made in the last 19 years. In the panic of 1903-04 the country's output in December, 1903, was 846,695 tons, or 27,312 tons per day, while in January, 1904, the corresponding figures were 921,231 tons, or 29,717 tons per day. The July total this year falls between these two figures at 864,555 tons, or 27,889 tons per day. This is a decline of 199,278 tons, or 7605 tons per day from the June figures, or nearly 20 per cent.

The production of coke and anthracite furnaces in July, a 31-day month, amounted to 864,555 gross tons, or 27,889 tons per day, as compared with 1,064,833 tons, or 35,494 tons per day in June, a 30-day month, and with 846,695 tons, or 27,312 tons per day in December, 1903, a 31-day month. In July, 1920, the total output was 3,067,043 tons, or 98,931 tons per day. The total furnaces in blast on Aug. 1 was 69, as compared with 76 on July 1 and with 201 on Jan. 1. The 69 furnaces in blast Aug. 1 had a capacity of 28,175 tons per day, as compared with 32,195 tons per day for the 76 furnaces on July 1. There were 10 furnaces blown out or banked and three blown in in July, making the net loss for the month seven furnaces and for the last 10 months 250 furnaces. Only about one-sixth of the total normally active furnaces of the country were in operation on Aug. 1.

The July output of ferromanganese and spiegeleisen was about 1000 tons larger than that in June, or 5524 tons, as compared with 4536 tons. Of the July total only 1509 tons was ferromanganese. This is the smallest production of this alloy ever recorded.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from July, 1920, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons			
1920	Steel Works	Merchant	Total
July	71,954	26,983	98,937
August	72,740	28,789	101,529
September	74,908	29,402	104,310
October	77,214	28,998	106,212
November	71,669	26,161	97,830
December	66,037	20,185	87,222
January, 1921	62,327	15,618	77,945
February	58,060	11,127	69,187
March	42,691	8,777	51,468
April	33,854	5,914	39,768
May	33,054	6,340	39,394
June	29,444	6,050	35,494
July	23,086	4,803	27,889

The figures for daily average production, beginning with January, 1915, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1915—Gross Tons							
	1915	1916	1917	1918	1919	1920	1921
Jan.	51,659	102,746	101,643	77,799	106,525	97,264	77,945
Feb.	59,813	106,456	94,473	82,835	105,006	102,720	69,187
Mar.	66,575	107,667	104,882	103,648	99,685	108,900	51,468
Apr.	70,550	107,592	111,165	109,607	82,607	91,327	39,768
May	73,015	108,422	110,238	111,175	68,002	96,312	39,394
June	79,361	107,053	109,002	110,793	70,495	101,451	35,494
July	82,691	104,017	107,820	110,354	78,340	98,931	27,889
Aug.	89,666	103,346	104,772	109,341	88,496	101,529	.....
Sept.	95,085	106,745	104,465	113,942	82,932	104,310	.....
Oct.	100,822	113,189	106,550	112,482	60,115	106,212	.....
Nov.	101,244	110,394	106,859	111,802	79,745	97,830	.....
Dec.	103,333	102,537	92,997	110,762	84,944	87,222	.....

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the following totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These

last, while stated separately, are also included in the columns of "total production."

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1917—Gross Tons

	1917	1918	1919	1920	1921
Jan.	3,150,938	2,411,768	3,302,260	3,015,181	2,416,292
Feb.	2,645,247	2,319,299	2,940,168	2,978,879	1,937,257
Mar.	3,251,352	3,213,091	3,090,243	3,375,907	1,595,522
Apr.	3,334,960	3,288,211	2,478,218	2,739,797	1,193,041
May	3,417,340	3,446,412	2,108,056	2,985,682	1,221,221
June	3,270,055	3,323,791	2,114,863	3,043,540	1,064,833
July	3,342,438	3,420,988	2,428,541	3,067,043	864,555
7 mos.	22,412,330	21,423,560	18,462,349	21,206,029	10,292,721
Aug.	3,247,947	3,389,585	2,743,388	3,147,402	.....
Sept.	3,133,954	3,418,270	2,487,965	3,129,323	.....
Oct.	3,303,038	3,486,941	1,863,558	3,292,597	.....
Nov.	3,205,794	3,354,074	2,392,350	2,934,908	.....
Dec.	2,882,918	3,433,617	2,633,268	2,703,855	.....

Total, yr. * 38,185,981 38,506,047 30,582,878 36,414,114

*These totals do not include charcoal pig iron. The 1919 production of this iron was 327,097 tons.

Pig Iron Production by Districts, Gross Tons

	July (31 days)	June (30 days)	May (31 days)	April (30 days)
New York	34,407	34,241	37,202	41,223
New Jersey	5,554	6,051	10,291	9,875
Lehigh Valley	24,059	29,929	42,289	45,329
Schuylkill Valley	19,210	21,172	24,471	21,279
Lower Susquehanna and Lebanon Valleys	20,401	25,809	26,491	24,799
Pittsburgh district	185,643	243,025	281,391	304,308
Shenango Valley	none	12,077	27,981	30,763
Western Penna.	47,680	63,802	73,661	70,920
Maryland, Virginia and Kentucky	14,201	15,289	20,781	17,575
Wheeling district	16,167	18,207	17,981	1,991
Mahoning Valley	92,305	88,515	87,090	102,826
Central and Northern Ohio	80,150	116,003	133,801	107,747
Southern Ohio	6,266	25,798	29,103	11,843
Illinois and Indiana	201,175	214,834	249,671	239,585
Mich., Minn., Mo., Wis., Colo. and Wash.	50,764	56,857	65,004	68,058
Alabama	66,573	93,224	94,013	94,910
Tennessee	none	none	none	none
Total	864,555	1,064,833	1,221,221	1,193,041

Capacities in Blast Aug. 1

The following table shows the number of furnaces in blast Aug. 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast July 1:

Coke and Anthracite Furnaces in Blast

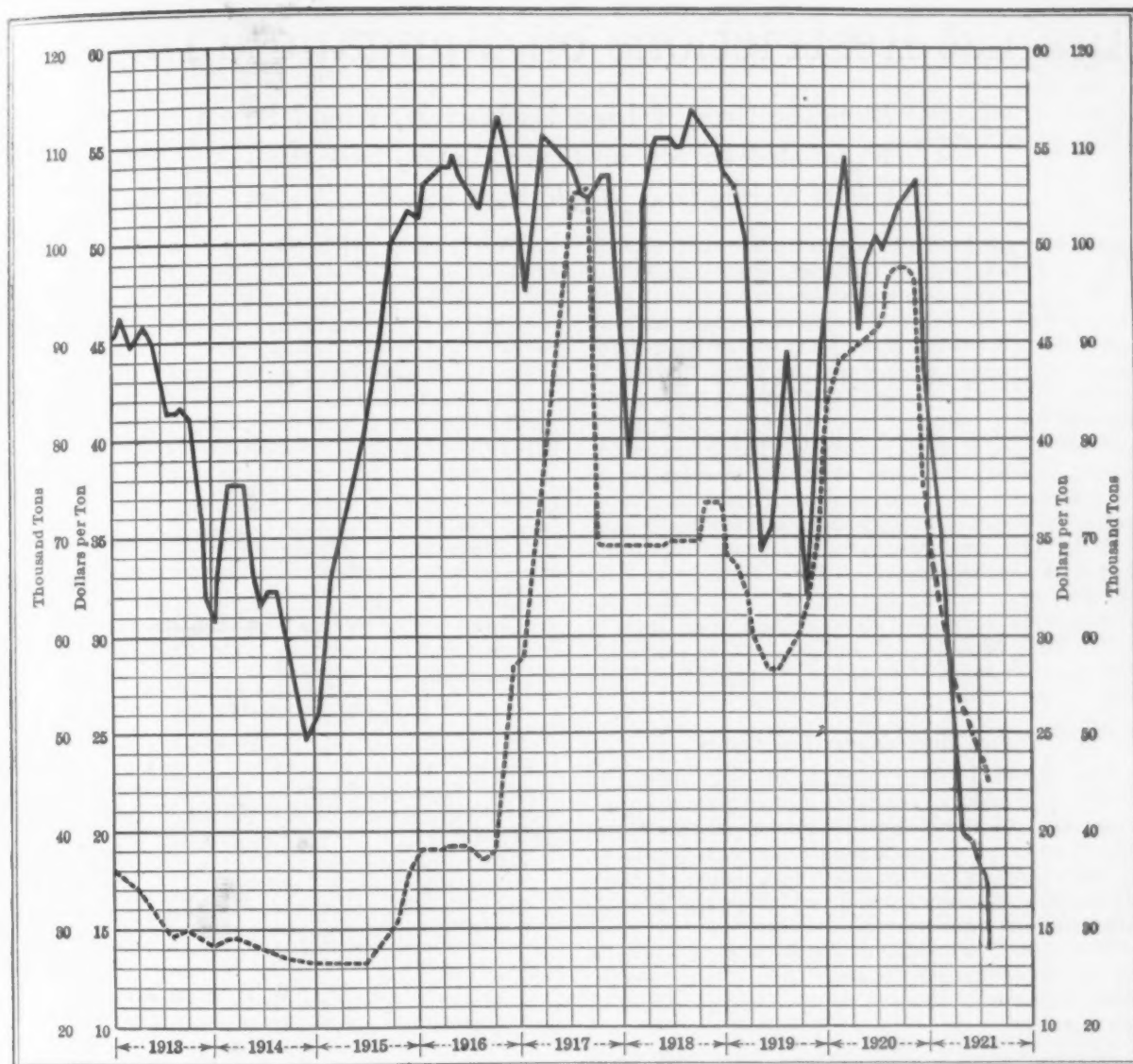
Location of Furnaces	Total Stacks	Aug. 1 In Blast	Capacity Blast per Day	July 1 In Blast	Capacity Blast per Day
New York:					
Buffalo	22	3	1,110	3	1,140
Other New York	4	0	.....	0	.....
New Jersey	4	1	180	1	175
Pennsylvania:					
Lehigh Valley	18	2	775	2	900
Spiegel	2	0	.....	0	.....
Schuylkill Valley	15	2	620	2	705
Lower Susquehanna	10	1	395	1	380
Lebanon Valley	8	2	260	1	135
Ferro	2	0	.....	0	.....
Pittsburgh District	55	17	7,000	16	7,550
Ferro and spiegel	4	1	180	1	110
Shenango Valley	19	0	.....	0	.....
Western Penn.	26	4	1,540	6	2,100
Maryland	6	1	340	1	335
Wheeling District	15	1	520	1	600
Ohio:					
Mahoning Valley	27	7	3,330	6	3,000
Central and Northern	26	5	2,650	6	3,220
Southern	16	1	100	2	200
Illinois and Indiana	42	12	6,125	13	7,000
Mich., Wis. and Minn.	11	1	510	2	850
Colorado and Missouri	6	2	775	2	740
The South:					
Virginia	16	1	110	2	175
Kentucky	7	0	.....	0	.....
Alabama	41	5	1,655	8	2,880
Tenn., Ga. and Texas	16	0	.....	0	.....
Total	418	69	28,175	76	32,195

The following furnaces were blown in during July:

The Robeson furnace in the Lebanon Valley; one Donora furnace of the American Steel & Wire Co. in the Pittsburgh district, and Mary furnace in the Mahoning Valley.

Among the furnaces blown out or banked during July were the following:

The Perry furnace and the second Josephine furnace in western Pennsylvania; the Alleghany furnace of the Alleghany Ore & Iron Co. in Virginia; the last of the four River



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

furnaces in northern Ohio; the Globe furnace in southern Ohio; the last of the three Calumet furnaces in Illinois; the last of the two Mayville furnaces in Wisconsin and the last Clifton furnace of the Alabama Co., the Alabama City furnaces of the Gulf States Steel Co. and one Ensley furnace of the Tennessee Coal, Iron & Railroad Co. in Alabama.

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnace at Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Steel Companies—Gross Tons

	Total Production			Spiegeleisen and Ferromanganese		
	1919	1920	1921	1919	1920	1921
Jan.	2,430,022	2,232,455	1,932,159	32,787	23,957	22,228
Feb.	2,209,470	2,181,679	1,625,695	28,105	28,038	29,013
Mar.	2,277,507	2,480,668	1,323,443	26,644	35,275	41,294
Apr.	1,838,677	1,968,542	1,015,621	17,308	27,628	24,310
May	1,586,805	1,128,720	1,024,678	14,604	33,407	9,232
June	1,655,944	2,209,770	883,312	14,254	34,751	4,536
July	1,996,604	2,230,567	715,664	14,805	36,789	5,524
Aug.	2,108,566	2,254,943	.....	17,419	36,985	.....
Sept.	1,828,613	2,247,250	.....	20,631	39,546	.....
Oct.	1,295,690	2,393,644	.....	20,238	34,786	.....
Nov.	1,727,656	2,150,075	.....	19,964	26,944	.....
Dec.	1,916,249	2,047,167	.....	15,718	28,023	.....

Bar Iron Association Agreement with Amalgamated

CHICAGO, Aug. 1.—The Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers came to an agreement on Saturday last on tonnage rates for iron puddling and rolling. The new scale comes within 3 per cent of the pre-war rates. The workers accepted a reduction to the scale of 1919-1920. On the basis of the new agreement, the rate for puddling at the July-August average selling prices of \$2.30, under which the men are now working, is \$11.38 per gross ton compared with a rate of \$12.52 a ton figured on the same selling average. This is a reduction of 9.01 per cent. On bar mill heating, the recent rate was \$1.116 per ton based also on the \$2.30 average, and the new rate is \$1.041 per ton. On ½ and 9/16 in. sizes the rate is reduced from \$2.567 to \$2.445 and on ¾ in. the reduction is from \$5.452 to \$4.957. Taking the base rate of \$1 under the old scale, the new agreement is 62 per cent above base, whereas the 1919-1920 agreement was 74½ per cent above base.

The National Works of the American Sheet & Tin Plate Co., Monessen, Pa., a plant of 25 hot tin mills, will resume operations Aug. 1, after a shutdown of more than three months.

Against Restrictions on Manganese Imports

Domestic Ores, if Used Exclusively, Would Be Exhausted in Six or Seven Years, and High Grade Native Ores Would Last But Two Years

AN important contribution to the literature of manganese ores and of ferromanganese is made in a pamphlet prepared by the raw materials department of the Midvale Steel & Ordnance Co. and published under the title "Why the Importation of High-Grade Manganese Ores and Ferromanganese Alloys Should Not Be Restricted," and the sub-title, "National Defense Endangered by Any Restriction on Imports of Manganese Ores and Alloys of Manganese." The compiler has brought together the facts as to the consumption of manganese ores and ferromanganese in the United States, the sources of supply and the amount and quality of domestic manganese ores, in support of the argument that the dependence of the American steel industry is very largely on foreign supplies and that therefore the admission of manganese ores and of foreign-made ferromanganese should not be restricted. The line of argument followed in the pamphlet is indicated in the summary quoted below:

Native High Grade Ores Scarce

"For the steel industry, manganese is an absolutely essential raw material for which no substitute is known. As an alloy, it is added to the steel as the final constituent and carries with it some deleterious impurities. To keep these impurities down to a minimum, high grade alloys must be used and such alloys can be made only from high grade manganese ores.

"Such ores occur abundantly in foreign countries but are almost entirely lacking in the United States. Lower grade ores occur in fairly large quantities in this country.

"From these lower grade ores alloys are made which can be and are largely used by manufacturers of steel, but the higher grades, desirable in nearly all cases, are necessary in the fabrication of such important lines as plates, structural steel, open hearth rails, spring steel, locomotive, freight and passenger car wheels, tires, axles and all war materials.

"While inferior alloys made from domestic ores were used as a matter of necessity during the war, this was only done by sacrificing quality of product.

"Domestic reserves of manganese-bearing ores cannot meet all or even a major part of the nation's requirements, although they can to some extent be substituted. If they could be used exclusively the supply would be exhausted in six or seven years, leaving this country with no reserves of this raw material so essential in times of war.

"Domestic ores are as a rule in small deposits, widely scattered, to a considerable extent remote from railroads and at great distances from points of consumption. Rail transportation alone frequently amounts to more than the delivered cost of higher grade foreign ores.

Tariff Cannot Create Ore Deposits

"The proposed tariff on manganese ores and manganese alloys will not protect an American industry from foreign competition. The industry of mining manganese ores does not and cannot exist in this country. A tariff cannot create raw materials. It will force to some extent the use of inferior substitutes produced by expensive methods and transported long distances by rail at excessively high rates. The importation of foreign manganese will continue because requirements can be met in no other way. The net

result will be to add to the cost of steel for domestic consumption and put an increased burden on that portion of the industry which seeks a foreign market.

"Only a few exceptionally well located manganese mines in this country can be operated profitably at the prices which will prevail if this tariff [as proposed in the Fordney bill] is imposed, and the benefits from the tariff will extend to but a few individuals. It does not appear to be the part of wisdom to stimulate artificially the depletion of our inadequate reserves in order to benefit a few at the expense of our individual and national welfare.

"Manganese is the only raw material necessary for the production of steel, the reserves of which within our borders are entirely inadequate to meet requirements in times of war. The lack of this material must be considered as one of the very weak points in our system of national defense."

Survey of the Problem

The facts concerning the importance of manganese to the manufacture of steel and foreign and domestic supplies of manganese ores and the domestic manufacture of ferromanganese are presented under the following heads:

1. Uses of Manganese
2. Ores and Alloys of Manganese
3. Alloys in the Manufacture of Steel
4. Sources of Supply
5. Domestic Manganese Ore Production
6. Requirements of the Steel Trade
7. Reserves of Manganese Ore
8. Quality of Foreign and Domestic Ores
9. Location of Domestic Ore Reserves with Reference to Points of Consumption

Two maps of the United States are given. The first indicates, State by State, the reserves of manganese ores of 35 per cent manganese and over; the second shows the distance of the principal domestic manganese ore supplies from the approximate center of the steel producing industry.

Sources of Supply

"Previous to the late war," the pamphlet says, "95 per cent of the manganese consumed in the United States was imported from India, Russia and Brazil. Some of it was imported in the condition of ore and some had been smelted in foreign countries and entered the United States as ferromanganese. Because of the great necessity of conserving shipping space, an effort was made in the late years of the war to substitute wherever possible lower grade domestic ores and alloys, with the result that in 1918 the domestic output supplied 40 per cent of the requirements as compared with 5 per cent in former years. This increase in the use of domestic ore, however, was effected only by submitting to a material sacrifice in the quality of the product. [It should be stated also that the stimulus to such a production of domestic manganese ore was an advance in the price of ferromanganese to ten times the price prevailing just before the war. The peak was \$450, while the average of weekly quotations was \$327 in 1917 and \$277 in 1918.—EDITOR] In 1918 the imports amounted to 491,303 tons of ore and 27,168 tons of ferromanganese, equivalent to a total of 559,223 tons of ore."

Imports and Domestic Production

In the following table the imports of manganese ores and of ferromanganese are shown for 1910 to 1920 inclusive and a comparison is made of imported ores and domestic production:

Year	Imports Ferromanganese, Gross Tons	Imports Ore, Gross Tons	Imports of Ore and Alloy in Terms of Ore Averaging About 50% Mn.	Domestic Product ⁿ 35% Plus Ore	Domestic Product ⁿ 15-35% Ore [†]
1910...	114,228	242,348	771,266	2,258	61,101*
1911...	86,263	176,852	554,361	2,457	44,437*
1912...	99,137	300,661	548,503	1,664	51,517*
1913...	128,070	346,070	666,245	4,048	59,403*
1914...	82,997	283,294	490,786	2,635	98,265*
1915...	55,263	320,778	458,935	9,613	70,202
1916...	90,928	576,321	803,461	31,474	176,130
1917...	41,969	629,972	734,894	129,405	730,759
1918...	27,168	491,303	559,223	305,869	818,003
1919...	33,022	333,344	415,899	55,322	211,632
1920...	59,000	607,000	754,500	94,000	416,000

In the 11 years 1910-20 about 62,000 tons of spiegeleisen was imported, and this is represented in the figures for ore in the third column of the table.

*Includes ores containing less than 15 per cent manganese.

†Exclusive of ore used for flux.

Requirements of the Steel Trade

The production of steel and the consumption of manganese ores in the making of ferromanganese are set forth as follows:

During the years 1915 to 1919 inclusive the average annual production of steel amounted to 39,823,800 tons. The average consumption of imported manganese in terms of ores was 592,500 tons, domestic ores, over 35 per cent manganese, 106,300 tons—total ferro-grade ores 698,800 tons. Ores from 10 to 35 per cent manganese—spiegel grades—401,300 tons. The ferromanganese consumption amounted to 273,670 tons per year.

The average production of steel for these years, 40,000,000 tons, is probably a reasonable estimate of the future production in this country over a period of ten years. Substitution of low-grade alloys was carried to the limit during these years. The normal consumption of ferro would exceed the above figures with a corresponding decrease in the use of spiegel.

From these calculations, based on records of recent years, it appears that the steel manufacturers in this country will require about 300,000 tons annually of high-grade ferromanganese to maintain a normal rate of manufacture. This is the equivalent of about 750,000 tons of high-grade manganese ore. The experience of the last few years has shown that the lower grade domestic product can, to some extent, be substituted, but the use of high-grade alloys in a very large proportion of cases is absolutely necessary. The above tables of imports and production clearly show how, with the necessity for substitution largely removed, the use of domestic ores has been practically discontinued.

Reserves of Manganese Ores

The pamphlet next considers the reserves of manganese ores, particularly at home:

"(1) Foreign: Russian reserves of high grade ore are estimated by various observers at from 50,000,000 to 100,000,000 tons, Brazil, India and Chile likewise contain large reserves of high grade ore, although definite estimates of tonnage are not available.

"(2) Domestic reserves: During the war the United States Geological Survey working in the interests of the War Industries Board examined nearly all known deposits of manganese and promising localities in the United States.

"A summary of domestic reserves in 1918 from Mineral Resources for 1919 as determined by the United States Geological Survey is given below:

	Gross Tons
Manganese ores containing 35 per cent manganese and average 40 per cent.....	699,750
Possible additional reserves.....	1,130,000
Manganiferous ores containing 5-35 per cent Mn. over 20 per cent silica and less than 30 per cent iron.....	1,323,000
Possible additional reserves.....	480,000
Manganiferous iron ores containing 5-35 per cent manganese, over 30 per cent iron and less than 20 per cent silica.....	16,157,800
Additional reserves in prospect.....	2,150,000
Total all grades.....	21,940,550

Life of Domestic Supplies

In discussing the domestic supply of manganese ores in their relation to the requirements of steel production in the United States the pamphlet makes this summing up:

"Of the domestic reserves 699,750 tons are suitable for the manufacture of low grade ferromanganese with a possible domestic 1,130,000 tons additional. While most of these ores are too high in silica and low in manganese to be of the most desirable quality, they will make a usable grade of ferromanganese. The known

and possible reserves represent about two years' consumption of steel makers in the United States.

"Of the balance of the reserves estimated, 11,374,000 tons on the Cuyuna Range in Minnesota contain less than 10 per cent manganese and high percentages of phosphorus, making them unfit even for the manufacture of spiegeleisen.

8,719,800 tons contain a possible average of 18 per cent manganese and although much of this is high in silica, can be used for the manufacture of spiegeleisen or silico-spiegel and will produce approximately 3,480,000 tons of these alloys. The manganese content of this spiegel will be less than one-fourth as great as standard ferromanganese, so this is the equivalent of about 800,000 tons of ferromanganese or two and one-half years' supply.

"It thus appears that the domestic reserves, both known and possible, which can be used to make the standard alloys or an alloy approaching them in composition, amount to about four years' supply for the steel trade.

"The 11,374,000 tons classed as unsuitable for the manufacture of spiegeleisen contain about 1,135,000 tons of manganese. If it be granted that this manganese can be effectively utilized as high manganese pig iron, thus saving an equal amount of additions, and an effective recovery of 75 per cent be assumed, 851,750 tons of manganese are added to the reserves. This would prolong the life of domestic reserves about two and one-half years. All the manganese ores and manganiferous iron ores containing over 5 per cent manganese estimated in the United States will meet domestic requirements for but six or seven years."

Brick Manufacturers Reduce Prices

PITTSBURGH, Aug. 1.—Effective July 28, manufacturers of fire clay and silica brick outside of Kentucky and the Chicago district, reduced prices \$2 to \$3 per 1000. Prices of Kentucky fire clay brick were cut about a week earlier, as were also those for Chicago district silica brick. A few Pennsylvania makers of fire clay brick still are quoting high duty brick up around \$45 per 1000, but the general maximum is \$40 and this price refers chiefly to small lots. The going prices on large lots of this grade range from \$34 to \$37. There has been some increase in blast furnace and steel works activities in the past week or two, and this development finds reflection in a large inquiry for brick. Republic Iron & Steel Co. is referred to as a prospective buyer. The reduction in prices may be ascribed to lower producing costs, through a reduction of 10 per cent in wages, common labor going from 30c. to 27c. per hour, and also to a realization that recent quotations could not be obtained. Actually, the cut is merely public affirmation of prices which previously had been named against inquiries. Magnesite brick also are lower, because supplies are large and competition for the small amount of business offered is extremely sharp.

We quote per 1000 f.o.b. works:

	High Duty	Moderate Duty
Fire Clay		
Pennsylvania	\$34.00 to \$40.00	\$28.00 to \$34.00
Ohio	34.00 to 38.00	28.00 to 33.00
Kentucky	33.00 to 37.00	30.00 to 35.00
Illinois	35.00 to 40.00	30.00 to 35.00
Missouri	40.00 to 45.00	35.00 to 38.00
Silica Brick:		
Pennsylvania		33.00 to 35.00
Chicago		38.00 to 42.00
Birmingham		45.00
Magnesite Brick:		
Standard size, per net ton.....		65.00 to 70.00
Chrome Brick:		
Standard size, per net ton.....		60.00 to 65.00

In June the United Engineering & Foundry Co., Pittsburgh, shipped 2300 tons of finished products from its Youngstown district plants, as compared with 1900 tons in May. Ninety per cent of the June shipments was on foreign orders, all of which were boxed and crated for ocean shipment. Much of this material was consigned to France and some to Japan. The company has erected one 2000-ton and one 800-ton forging press at the U. S. Navy yard, Mare Island, Cal.

COKE WAGES REDUCED

Frick Company Lowers Rates Ten Per Cent— May Resume Operations

UNIONTOWN, PA., Aug. 1.—A further reduction of 10 per cent in wages, which would affect, under normal operations, 40,000 men, was announced in notices posted at noon July 30 by the H. C. Frick Coke Co., subsidiary of the United States Steel Corporation. The new scale carries Frick wages back approximately to the wage scale of Nov. 10, 1917. The rates of the new scale, compared with those of the independents, follow:

	—Frick Scale— Aug. 1, 1921 May 16, 1921		Independent
Pick mining and loading room and rib coal per 100 bu.....	\$2.38	\$2.65	\$2.06
Pick mining and loading heading coal per 100 bu.....	2.63	2.92	2.27
Pick mining and loading wet heading coal per 100 bu. * (Pick miners to drill holes and furnish powder)...	2.77	3.08	2.45
Loading shortwall machine coal per 100 bu. (Company to drill holes and furnish powder).....	1.50	1.65	1.50
Drawing coke per 100 bu. charged..	1.40	1.51	1.30
Drivers, rope riders, cagers, track-layers, blasters, timbermen (shafts and slopes) per day (8 hr.).....	5.05	5.55	4.55
Same (drifts) per day (8 hr.)...	5.00	5.50	4.50
Assistant track-layers and timbermen per day (8 hr.).....	4.35	4.75	3.95
Fire bosses per day.....	6.30	7.00	5.40
Mine laborers per day (8 hr.).....	4.15	4.55	3.75
Leveling per oven (hand).....	.20	.22	.19
Outside day labor per day (9 hr.)...	3.00	3.30	3.00

Action of the Frick company at this time was unexpected. While observers had expected a further reduction from the May 16 scale, still none believed that the reduction would come before fall. The independent operators, on July 1, put into effect their second reduction of the year, carrying approximately a 20 per cent reduction and which now is still beneath the new scale put into effect by the Frick company to-day.

The action is considered highly significant and as indicative of an early resumption on the part of the Frick company. All coke ovens of the Frick company are idle and coal production is now about 35 per cent normal.

The Pittsburgh Steel Co., which resumed operations at Monessen this week to the extent of giving employment to an additional 2500 men, ordered simultaneously resumption at Alicia No. 1 and Alicia No. 2 mines, near Brownsville, which the company recently acquired. The mines are operating at about 70 per cent normal under reduced wage scales and shipments are being made by river. Three hundred ovens were put into operation by the Bourne-Fuller Co. this week. Reports that this company has landed a part of the Spencer-Wickwire contract lack confirmation.

Promoting Group Enthusiasm

United Effort is the title of the publication started by the United Engineering & Foundry Co., Pittsburgh, for its employees, the first issue of which appeared in July. In an introductory article, President F. C. Biggert, Jr., states that "an organization is successful in proportion to the amount of 'group enthusiasm' which it possesses. The man whose every hammer blow is for the good of the group is among the most valuable assets an organization can have. His is the spirit of all the great things men have accomplished. He is possessed of that high type of self-interest which realizes that what is good for the group is good for him. He is a 'getter-done.' He does not stand out momentarily as does the individualist, but slowly and surely takes his permanent place of importance."

It is to promote this spirit of "group enthusiasm," Mr. Biggert explains, that the company instituted social and business meetings of department heads, a suggestion system, provided group life insurance and publishes the monthly bulletin.

Effective Aug. 1, the American Can Co. of New Castle, Pa., reduced wages of its employees 10 per cent. The company's plant is operating at 80 per cent, which rate it is planned to increase if the present volume of business continues.

MORE MEN EMPLOYED

Large Increase in Forces Working in Detroit Automobile Plants

DETROIT, July 30.—The question as to whether automobile sales are really increasing and whether the outlook in the automotive industry is really brighter is best answered by the labor statistics that cover the automotive plants.

The report of the Employers' Association of Detroit for the two weeks of July 12 and 19 show that a total of 6500 men was added during that period. On July 5 there were 108,798 men employed in the 79 plants of the association, and on July 19 there were 115,397. Normally three-quarters of these men would be in the automotive plants.

The Packard Motor Car Co., during the last week has added 700 men to the payrolls, making a total of 4000 now employed in the plants. This because of additional business on hand and in sight.

Figures compiled by Detroit newspapers for Saturday, July 30, show that automotive production in the city has now reached 87 per cent of normal.

Conditions in Indianapolis

The foundrymen's association of Indianapolis has just made a survey of the labor situation in foundries in that city to counteract rumors which it was reported the molders' union was circulating, to the effect that union foundries in Indianapolis, following their recent wage reduction from 90c. to 75c. per hour, eight hours per day, had entered into a year's agreement with the union. The association in its report states that there are 34 foundries in Indianapolis, one of which has always been a union shop. Of the 33 remaining foundries, eight are union shops, but only two of these have any agreements whatever with the molders' union for any definite period of time, these two being stove foundries. Five are non-union shops, 19 are open shops and one has not started operations. The 24 open and non-union shops do not deal with the union at any time. The six union foundries other than the two stove foundries have no agreement with the union, and since the 15 cent reduction in wages, their molders have been working from day to day without any agreement. The two union stove foundries are bound by an agreement with the Stove Founders' National Defense Association. A third stove foundry is operated on an open shop basis.

May Not Sign Amalgamated Scale

Recent developments indicate that the A. M. Byers Co., Pittsburgh, operating the largest puddling mill plant in the world at Girard, Ohio, may not sign the bar iron agreement with the Amalgamated Association of Iron, Steel and Tin Workers this year. The company was not a party to the conference which was held at Atlantic City in June nor to the conference last week in Chicago. It was announced that the company would await developments and indicate its position following scrutiny of the scale agreed upon. It is stated that some extra concessions may be demanded from the boilers before the scale is signed. In years past the Byers company refused to sign the Amalgamated scale and accepted instead the agreement of the Sons of Vulcan, composed of dissatisfied members of the Amalgamated who broke away from that organization. Subsequently there was a fight against the Sons of Vulcan scale and the company went back to the Amalgamated scale, thereby causing the virtual disintegration of the Sons of Vulcan.

The works of the Nash Motors Co. at Kenosha, Wis., is now operating five and one-half days a week with 3000 employees. Its payroll there never exceeded 5000.

Because since last fall some employees have had wages reduced three times, some twice and others only once, the Spencer Wire Co., Spencer, Mass., Wickwire-Spencer Steel Corporation, has placed the payroll on an average scale, which represents a wage reduction average of about 8 per cent. The plant has been operating on a four-day week schedule, but beginning Monday, last, will operate five days a week.

Jones & Laughlin Production

A reduction in the rate of pay of common labor to 30c. an hour from 37c. will become effective Aug. 1, in the works of the Jones & Laughlin Steel Co. It is understood that adjustments will be made in the pay of all other wage and tonnage employees, effective the same date. The new rate will be approximately the same as already has been established by the other Pittsburgh and Valley independents.

Reductions in Chicago

Following the example of Eastern steel mills, Chicago district steel makers are making further cuts in wages. The Republic Iron & Steel Co. at East Chicago, Ind., and the Interstate Iron & Steel Co., East Chicago, Ind., and Chicago, have reduced common labor to 30c. an hour. The Inland Steel Co. expects to take similar action.

In the Field of Labor

The final draft of a blanket agreement designed to prevent strikes and lockouts in the building industry and to fix wage scales by arbitration is being voted on this month at St. Louis by the unions affiliated with the Building Trades Council and the employing contractors in the Building Industries Association.

Union blacksmiths, helpers and dropforgers employed at the New York, New Haven & Hartford Railroad Co. Readville, Mass., shops have voted to reject working rules submitted by the management and have demanded the retention of the national agreement put into effect under Government control of the carriers.

Molders in Boston and the vicinity, for the second time within a year, have accepted a reduction in wages. The present reduction is from \$6.25 per 8-hr. day or 78c. plus per hr. to \$6 per day or 75c. per hr., is effective Aug. 15, and continues until Feb. 15, 1922. The previous wage agreement ran for three months only. The \$6 per day rate compares with \$7.20 per 8-hr. day or 90c. per hr. during the war, and with \$3.50 per 9-hr. day or practically 39c. per hr. prior to the war.

Employees' Suggestions

Following adoption of a plan which would enable employees to make suggestions for their welfare and that of the company, the United Engineering & Foundry Co., Pittsburgh, received from its various plants 145 suggestions, of which 62 were accepted. Prizes as high as \$100 were awarded for these ideas. One useful suggestion was to the effect that a cheaper form of letter head be used for inter-department letters. The interest of an employee in the company's efficiency was revealed in a suggestion that tool room service be improved so as to prevent the loss of time due to a line of men waiting at the tool room window. A scheme of insurance was proposed, which, while not adopted, had some influence in urging action by the company on another plan which it had under consideration and has since inaugurated.

The P. & F. Corbin plant, American Hardware Corporation, New Britain, Conn., has established a 44-hr. weekly schedule, as against 32 heretofore.

The Milwaukee works of Nash Motors Co., Kenosha, Wis., manufacturing four-cylinder passenger cars exclusively, which resumed operations July 5 after a recess of a month, has increased its working force to capacity, namely, 1000 men, and is producing 50 cars a day, the limit of existing facilities. Construction of additional units, including a foundry, probably will not be undertaken until next spring. B. W. Twyman is general manager at Milwaukee.

The New York Central Railroad has resumed operations in its Collinwood shops at Cleveland, employing about 500 men, or half the normal force. These shops have been closed five months.

The Timken-Detroit Axle Co., Canton, Ohio, has resumed operations on a 50 per cent schedule.

PLANT OPERATIONS

Increased Operations at Pittsburgh and Wheeling

PITTSBURGH, Aug. 1.—Steel plant activities in this and nearby districts are on the increase and while it is probable that plants which have started up in the past week or ten days may be forced to slow down again before steady work is established, it is generally believed that early July saw the low ebb of operations. A number of idle units started up last week after suspensions varying from a few weeks to several months, and this week has brought several additions to the active list. Exhaustion of mill stocks, due to more frequent, if not of really heavy, demands from consumers and distributors, is behind the resumption at some plants, while at others it may be ascribed to an accumulation of orders during the recent period of non-production. It is probable, therefore, that in the immediate future plant activities will be intermittent, for real price stabilization is lacking and consequently, until price declines seem to have run their course, buyers will continue to order supplies only when needed. Such buying is not conducive to the building up of order books or of constant mill and steel works operation.

In the Wheeling district, the Wheeling Steel & Iron Co. to-day started up a portion of its tubular plant at Benwood, W. Va. The schedule for this week follows:

Wheeling Steel & Iron Co.—Top furnace idle; Martins Ferry furnace idle; Belmont furnace and plate mills idle; Benwood steel plant and tube works operating 40 per cent; Yorkville plant idle.

LaBelle Iron Works—Steubenville plant operating 30 per cent; Wheeling plant operating 40 per cent.

Whitaker-Glessner Co.—Martins Ferry plant idle; Beech Bottom plant idle; Portsmouth plant idle.

U. S. Steel Corporation—Carnegie Steel Co. plant, Belaire, idle; Laughlin plant, American Sheet & Tin Plate Co., Martins Ferry, idle; LaBelle plant, American Sheet & Tin Plate Co., Wheeling, idle; Riverside plant, National Tube Co., Benwood, idle.

On July 27 the Pittsburgh Steel Co. turned on the blast at one of its blast furnaces, which had been idle since July 1, and resumed making steel in six open-hearth furnaces at Monessen, Pa. This represents about 50 per cent of capacity. On June 30, the entire plant shut down. National works of the American Sheet & Tin Plate Co., also at Monessen, Pa., resumed operations today after a suspension of several weeks. Of the 139 blast furnaces in the territory extending from Johnstown to Wheeling, W. Va., to Pittsburgh and Youngstown, 29 now are in blast. These are distributed as follows: Cambria Steel Co., 2; Carnegie Steel Co., 14; Jones & Laughlin Steel Co., 2; Weirton Steel Co., 2; Pittsburgh Steel Co., 1; American Steel & Wire Co., 1; National Tube Co., 2; Weirton Steel Co., 1; Republic Iron & Steel Co., 1; Youngstown Sheet & Tube Co., 2; Brier Hill Steel Co., 1; Sharon Steel Hoop Co., 1; American Manganese Mfg. Co. (merchant), 1.

An interesting feature in connection with the operation of the active blast furnace of the American Steel & Wire Co., which is at Donora, Pa., and recently went into blast, is that the experiment of operating it on three 8-hr. shifts is being tried. This step primarily is for the purpose of providing work for as many men as possible, but it also will give the management a line on the possibilities of this plan.

Railroads Add to Forces

The Union Pacific Railroad has ordered the taking back of 1500 men on the Mountain division between Cheyenne, Wyo., and Ogden, Utah. The Chicago Great Western Railroad has opened the locomotive department of its shops at Oelwein, Iowa, which had been shut down for two months. Several hundred men were re-employed. The officers of the Chicago, Rock Island & Pacific Railroad have voluntarily recommended to the board of directors and the board has approved a 10 per cent reduction in the pay of all executive officers and also such a reduction in the pay of supervisory officers as will meet changed conditions.

Iron and Steel Markets

PRICES IRREGULAR

Further Business at the Low Figures of Last Week

New Low Record in Pig Iron Production—Somewhat Better Operation

The latest transactions in steel products have shown substantially the same low prices that were uncovered in the previous week, with here and there a new decline, sheets and plates apparently being the lines of least resistance. Willingness to name a price that will take the business, where the tonnage is larger than usual, is still the attitude of the leading steel companies, albeit sentiment is better in view of a somewhat larger volume of orders and inquiries and the feeling that improvement in other industries will soon be felt in iron and steel.

Some publicity has been given to what is called a new and lower schedule of prices by the Steel Corporation, particularly on bars, plates, shapes, tin plate and sheets, but the figures given have been the basis of ordinary transactions for more than a fortnight.

The general average of steel mill operations in the Pittsburgh, Youngstown and Wheeling districts is somewhat higher this week, due largely to the starting of departments that have been idle in some cases for several weeks. A maintenance of the new rate of activity is dependent in most cases on the developments of the next few weeks.

The returns of July pig iron production confirm the week-to-week reports last month that iron and steel works operations were declining. In the 31 days of July 864,555 tons of pig iron was made. This was at the rate of 27,889 tons per day, or more than 20 per cent less than the June rate of 35,494 tons per day, the June total being 1,064,833 tons.

Not since December, 1903, nearly 18 years ago, when 846,695 tons was produced, has the country seen so small a pig iron output as last month's.

July showed a net loss of 7 in active furnaces, 69 being in blast Aug. 1, with a capacity of 28,175 tons per day, against 76 on July 1, representing a daily capacity of 32,195 tons. The July output was at a yearly rate of about 10,000,000 tons, or not far from 20 per cent of the country's capacity.

Pittsburgh, Cleveland and Chicago reports agree as to continuing irregularities in nearly all finished products. Some bars have been taken at 1.70c., Pittsburgh. At Chicago 1.60c. to 1.70c., Pittsburgh, on plates has been the usual range, whereas Cleveland reports 1.70c. to 1.75c. Smaller transactions are at \$2 to \$3 per ton above these levels.

The \$5.25 price on tin plate which is referred to in some quarters this week as new, is the formal recognition of recent competition, aided by the new wage scale. Hoops and bands have shown new price

cutting, and in all markets irregularities are reported in nuts, bolts and rivets.

The Western Bar Iron Association has reached an agreement with the Amalgamated Association on the wage scale, the workers going back to the 1919 basis, which is about 3 per cent above pre-war rates. The reduction from present labor cost is about 10 per cent.

The orders for repairs to 6500 cars distributed by the New York Central Lines will require about 30,000 tons of steel. Repairs to over 900 cars are planned by the Illinois Central, on about 275 by the Pittsburgh & West Virginia and on 500 to 1000 in addition to the 500 awarded last week by the Buffalo, Rochester & Pittsburgh. Car builders feel that the turn has come in railroad purchases, though the increase in volume of business will be gradual for some time.

While bids on the 105-mile Bombay water pipe line, a \$10,500,000 project requiring about 78,000 tons of steel, were opened last week, the award is not yet known. It is known that American bids on lock bar pipe were not the lowest, but that fact does not determine that American pipe and American plates are out of the running.

Pig iron price reductions include \$1 on charcoal and 50c. on foundry grades at Chicago, \$1 on basic and 50c. on Bessemer and malleable at Pittsburgh and \$1 on Southern iron; while in the East very little change has taken place and some improvement in demand is reported. In ferroalloys prices of silveries have been marked down \$8 and of Bessemer ferrosilicon \$8.50.

A set back to the recent promising improvement in the fabricated steel trade is generally reported but new work totaling 8400 tons has appeared and awards for the past week cover 11,000 tons.

Pittsburgh

PITTSBURGH, Aug. 2.

Interest in the steel trade here centers largely in the placing of about 7000 tons of plates, shapes and bars recently inquired for by the Mt. Vernon Bridge Co., Mt. Vernon, Ohio. This is the largest piece of business that has been before manufacturers and its allocation is the subject of much speculation in view of the fact that the Ohio State University stadium, which will take more than half of the total tonnage, was placed at a price which would indicate a plain material base of around 1.60c. It is said the Mt. Vernon company did not have protection at a price anywhere near that low. While the general average of steel plant and mill operations is somewhat higher this week than it has been, and the more cheerful sentiment of the past few weeks continues, actual business has not grown appreciably and the improvement in the undertone seems to have been generated largely by the lowering of the Federal Reserve Bank discount rate, the improvement in the condition of the banks of the country, the attitude of the Administration toward tax reductions, the disarmament proposal and other developments that are in the making and outside, rather than within, the industry itself. The fact that two or three large automobile interests which a short time ago were on the ragged edge in a financial way have in the recent past been refinanced also has helped sentiment. As a rule, increases which have come in plant activities are due to accumulations of orders or to the

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous*

For Early Delivery

Pig Iron, Per Gross Ton:	Aug. 2, 1921	July 26, 1921	July 5, 1921	Aug. 3, 1920
No. 2X, Philadelphia†.....	\$21.35	\$21.35	\$25.50	\$49.15
No. 2, Valley furnace†.....	19.50	19.50	21.00	46.00
No. 2, Southern, Cin'ti†.....	23.50	24.50	25.50	45.60
No. 2, Birmingham, Ala.†.....	19.00	20.00	21.00	42.00
No. 2, foundry, Chicago*.....	18.50	18.50	20.00	46.00
Basic, del'd, eastern Pa.....	21.25	21.25	23.50	44.40
Basic, Valley furnace.....	18.00	19.00	20.00	46.50
Bessemer, Pittsburgh.....	21.96	22.46	23.46	48.40
Malleable, Chicago*.....	18.50	18.50	20.00	46.50
Malleable, Valley.....	20.00	20.50	21.50	46.00
Tray forge, Pittsburgh.....	21.46	21.46	21.96	44.40
L. S. charcoal, Chicago.....	35.00	36.00	37.50	57.50
Ferromanganese, del'd.....	70.00	70.00	70.00	225.00

Rails, Billets, Etc. Per Gross Ton:	Aug. 2, 1921	July 26, 1921	July 5, 1921	Aug. 3, 1920
Bess. rails, heavy, at mill.....	\$45.00	\$45.00	\$45.00	\$55.00
O-h. rails, heavy, at mill.....	47.00	47.00	47.00	57.00
Bess. billets, Pittsburgh.....	30.00	30.00	33.00	65.00
O-h. billets, Pittsburgh.....	30.00	30.00	33.00	65.00
O-h. sheet bars, P'gh.....	32.00	32.00	35.00	70.00
Forging billets, base, P'gh.....	35.00	35.00	38.00	85.00
O-h. billets, Phila.....	35.74	35.74	38.74	69.10
Wire rods, Pittsburgh.....	42.00	42.00	45.00	75.00
Skelp, gr. steel, P'gh., lb.....	1.85	1.90	2.00	3.25

Finished Iron and Steel,	Aug. 2, 1921	July 26, 1921	July 5, 1921	Aug. 3, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia.....	2.10	2.10	2.25	4.75
Iron bars, Chicago.....	1.75	1.85	2.10	3.75
Steel bars, Pittsburgh.....	1.75	1.75	1.90	3.25
Steel bars, New York.....	2.13	2.13	2.28	4.02
Tank plates, Pittsburgh.....	1.80	1.80	1.90	3.25
Tank plates, New York.....	2.18	2.18	2.28	3.52
Beams, etc., Pittsburgh.....	1.85	1.85	2.00	3.10
Beams, etc., New York.....	2.23	2.23	2.38	3.27
Steel hoops, Pittsburgh.....	2.40	2.50	2.50	5.50

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Aug. 2, 1921	July 26, 1921	July 5, 1921	Aug. 3, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.....	3.00	3.00	3.50	7.50
Sheets, galv., No. 28, P'gh.....	4.00	4.00	4.50	9.00
Sheets, blue an'd, 9 & 10.....	2.40	2.40	2.65	6.00
Wire nails, Pittsburgh.....	2.75	2.75	3.00	4.25
Plain wire, P'gh.....	2.50	2.50	2.75	3.50
Barbed wire, galv., P'gh.....	3.40	3.40	3.65	4.45
Tin plate, 100-lb. box, P'gh.....	\$5.25	\$5.50	\$5.75	\$9.00

Old Material, Per Gross Ton:	Aug. 2, 1921	July 26, 1921	July 5, 1921	Aug. 3, 1920
Carwheels, Chicago.....	\$12.50	\$12.50	\$13.25	\$37.50
Carwheels, Philadelphia.....	16.00	16.00	18.00	40.00
Heavy steel scrap, P'gh.....	12.00	12.00	12.00	27.00
Heavy steel scrap, Phila.....	11.00	11.00	11.00	23.00
Heavy steel scrap, Ch'go.....	10.00	10.00	10.00	24.50
No. 1 cast, Pittsburgh.....	16.00	16.00	16.00	41.00
No. 1 cast, Philadelphia.....	17.00	17.00	16.00	38.00
No. 1 cast, Ch'go (net ton).....	11.50	11.50	12.50	36.00
No. 1 RR. wrot, Phila.....	14.00	13.50	13.50	33.00
No. 1 RR. wrot, Ch'go (net).....	9.25	9.25	9.50	24.50

Coke, Connellsville,	Aug. 2, 1921	July 26, 1921	July 5, 1921	Aug. 3, 1920
Per Net Ton at Oven:	Cents	Cents	Cents	Cents
Furnace coke, prompt.....	\$2.75	\$2.75	\$3.00	\$18.00
Foundry coke, prompt.....	3.75	4.00	4.25	19.00

Metals,	Aug. 2, 1921	July 26, 1921	July 5, 1921	Aug. 3, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	12.00	12.50	12.75	19.00
Electrolytic copper, N. Y.....	11.75	12.25	12.62½	19.00
Zinc, St. Louis.....	4.20	4.25	4.35	7.70
Zinc, New York.....	4.70	4.75	4.85	8.05
Lead, St. Louis.....	4.20	4.35	4.25	8.75
Lead, New York.....	4.40	4.40	4.40	9.00
Tin, New York.....	20.50	26.00	29.87½	48.50
Antimony (Asiatic), N. Y.....	4.60	4.65	4.75	7.25

Composite Price, Aug. 2, 1921, Finished Steel, 2.364c. per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	July 26, 1921, 2.364c.
	July 5, 1921, 2.557c.
	Aug. 3, 1920, 3.939c.
These products constitute 88 per cent of the United States output of finished steel.	10-year pre-war average, 1.684c.

building up of mill stocks, which have been depleted by recent demands.

Possibly there is a little more adherence to the quotations recently established than there was to the previous schedules. It is too soon, however, to venture the suggestion that an open market has disappeared. A good many manufacturers are complaining of the losses entailed on to-day's prices, but others seem to have thrown their cost books into the discard and in a market such as the present one the prices are established by the lowest seller. Tin plate has settled since last reports another \$5 per ton to \$5.25 per base box, while the price of hoops and bands is not more than 2.40c., Pittsburgh, a drop of \$2 per ton from the recent base. The latter change points to a further revision downward of hot-rolled strips. The market is very unsettled in nuts, bolts and rivets and prices of track fastenings are steadily working downward.

The pig iron market has fallen to \$18 on basic grade at Valley furnaces, but even this price would have to be shaded on Pittsburgh district business to compete with furnaces having a more favorable freight rate.

An interesting development in the coke market is the fact that the fuel for the furnace of the Sharon Steel Hoop Co., which went into blast last Saturday, will be provided from by-product instead of beehive ovens. The by-product coke in this instance was obtained at least 25c. a ton below the prices quoted on beehive oven fuel.

Pig Iron.—The price of Valley basic pig iron has dropped \$1 a ton since last report, on a sale of 2000 tons, which moved at \$18, furnace. Even at this figure, Valley furnaces have not much chance of getting business within the Pittsburgh district for the reason that iron of this grade is available at a lower delivery figure from furnaces which have a lower freight rate.

No business recently has been done in Bessemer iron, but it is being offered at \$20 from Valley furnaces, and we revise our quotations accordingly. Business in foundry iron is entirely of small lots on which prices varying anywhere from \$19.50 to \$20 furnace for No. 2 grade are claimed to have been paid. The W. P. Snyder & Co. averages for July show that sales of basic grade from Valley furnaces moved at an average price of \$18.802, against \$20.70 in June, and Bessemer at \$20.875, against \$23 in the previous month.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic.....	\$18.00
Bessemer.....	20.00
Gray forge.....	18.50
No. 2 foundry.....	19.50
No. 3 foundry.....	19.00
Malleable.....	20.00

Ferroalloys.—Price tendencies still are down. Against a recent inquiry for a moderate tonnage of ferromanganese a quotation of \$69 delivered, was made on 76 to 80 per cent domestic material and one maker was willing to provide 80 per cent alloy at an advance of only \$1 per ton over that price. The general asking price of domestic producers is \$75 delivered, but \$70 measures to-day's maximum price possibility, on sales. Current quotations of \$67.50 to \$70 seaboard on English ferromanganese are nominal as far as business in this district is concerned. It is believed that substantial concessions would be made against an inquiry calling for future shipment and involving a fair sized tonnage. English makers are not pressing for business, evidently waiting to see what is done with regard to the American tariff. The protest against the supposed duties by American steel manufacturers is so strong that the belief prevails here that manganese ore will be put back on the free list and a moderate tariff allowed on ferromanganese. Spiegeleisen is quoted at \$25 to \$30 furnace.

for average 20 per cent material, with no business doing in this district. One large consumer of this alloy is said to be considering changing over to ferromanganese on the ground that the latter is the cheaper material. The most recent business in 50 per cent ferrosilicon was a carload at \$64 delivered. A Valley steel maker is asking prices on a carload but figures on buying it at around \$60 delivered. Bessemer ferrosilicon has been reduced \$8.50 and silvery has been reduced \$8.

We quote 76 to 80 per cent ferromanganese at \$70 delivered on domestic; English, 76 to 80 per cent, \$67.50 to \$70, c.i.f. Atlantic seaboard. We quote average 20 per cent spiegeleisen at \$25 to \$30 (nominal) furnace; 50 per cent ferrosilicon, \$64 to \$65 furnace, freight allowed, for domestic and foreign material. Bessemer ferrosilicon is quoted f.o.b. Jackson County and New Straitsville, Ohio, furnaces as follows: 9 per cent, \$33; 10 per cent, \$36.50; 11 per cent, \$41; 12 per cent, \$43.10. Silvery iron, 6 per cent, \$24; 7 per cent, \$25.50; 8 per cent, \$27.50; 9 per cent, \$29.50; 10 per cent, \$32; 11 per cent, \$35.30; 12 per cent, \$38.60. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—The recent cut of \$3 per ton in prices does not seem to have materially stimulated the demand, which also as yet has failed to reflect the increased sheet and bar mill operations. The explanation probably is to be found in the fact that finishing mills generally still have rather large stocks of high-cost steel which they are anxious to work off.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$30; 2 x 2-in. billets, \$32; Bessemer and open-hearth sheet bars, \$32; slabs, \$31; forging billets, ordinary carbons, \$35, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The general quotation is \$42 Pittsburgh on common soft rods of the base gage, but makers here frankly admit that only small tonnages can be moved at that price and it is also stated that a substantial tonnage would bring out a lower price. Prices are given on page 305.

Plates.—Practically all of the inquiries developing in this market are for small tonnages for early delivery and only occasionally does an individual sale reach as much as 500 tons. Against such inquiries the recently established price of 1.85c. is fairly well observed.

We quote sheared plates, 3/4 in. and heavier, tank quality, at 1.80c. to 1.85c. f.o.b. Pittsburgh.

Structural Material.—Only small jobs lately have been coming to fabricating shops in this district and the number of such awards have been few. The Memphis Steel Construction Co. recently took 650 tons for a new hotel at Greensburg, Pa., and McClintic-Marshall Co. reports 100 tons for three-deck plate girder stands for Stephen Sanford & Sons, Amsterdam, N. Y. The common complaint of fabricators is that only by sacrificing all profit and even going into their own pockets is it possible to secure an order these days. Competition for orders in plain material is pretty sharp and the public quotation of 1.85c. is said to refer only to small tonnages. Prices are given on page 305.

Iron and Steel Bars.—There has been no decided improvement in the demand for soft steel bars, but small lot orders are slightly more numerous than they were recently and some makers have accumulated enough of such orders to put on some idle capacity. There is not much disposition by makers here to shade 1.75c., Pittsburgh. Reinforcing bars rolled from new billets also are held at 1.75c., but are encountering considerable competition from such bars rolled from old rails. The latter nominally are quoted at 1.75c., but this price is understood to have been shaded \$2 to \$3 per ton. Refined iron bars are quoted at 2.40c., base, but this is purely against small lots, and it is admitted that a sizable inquiry would develop a price as low as 2.25c.

We quote steel bars rolled from billets at 1.75c.; reinforcing bars, rolled from billets, 1.75c. base; reinforcing bars rolled from old rails, 1.60c. to 1.75c.; refined iron bars, 2.25c. to 2.40c., in carloads, f.o.b. mill, Pittsburgh.

Steel Rails.—Railroads tributary to Pittsburgh are not specifying at all freely against their orders for standard rails placed early in the year. Business in light rails also is pretty limited. The Delaware, Lackawanna & Western Railroad recently inquired for 2000 tons of light rails in connection with its coal mine operations, and is understood to have had a quotation of

1.85c. Pittsburgh on rails rolled from new billets, and of \$40 per gross ton delivered Scranton, on rerolled rails.

We quote 25 to 45-lb. sections, rolled from new steel, 1.85c. to 1.90c.; rolled from old rails, 1.75c.; standard rails, \$45 mill for Bessemer and \$47 for open-hearth sections.

Nuts, Bolts and Rivets.—There is no improvement in business and prices are unsettled and weak. It is reported that makers outside this district recently have taken business in large machine bolts at 65, 10 and 10 off list. This is below the ideas of makers here, but rather than lose regular customers, some are meeting this price. Rivets have had a further drop of about \$3 per ton, being quotable at \$2.50 for large structural rivets and \$2.60 for large boiler rivets. Small rivets are quoted at 70 and 5 off list. Makers here are inclined to doubt that large structural rivets have sold as low as \$2.40, although there have been fairly authentic reports of that character. Track bolts are down to 3.80c. base for carloads of one size, with an extra charge of 1c. per lb. for less than carloads of one size. Prices and discounts are given on page 305.

Spikes.—The market shows very little activity in spikes or other track fastenings in this district. Such inquiries as are coming out for spikes produce intense competition, and the result is that prices are very much in buyers' favor. Some makers still are asking \$3 base on all except bolt and barge spikes but with a number of makers willing to take orders at \$2.75 base, the higher merely is a quotation. Tie plates are quotable at \$2 to \$2.05, such prices having been named against recent inquiries. Prices are given on page 305.

Cold-Finished Steel Bars.—Prices are not very well defined. The "official" quotation of most manufacturers is 2.60c. base, but at least one maker has taken business at 2.50c. and it is stated that on some purchases recently made by a large automobile manufacturer a price of 2.40c. was done. Conversion charges vary with the different manufacturers; hence the difference in price ideas. Business still is of moderate proportions.

Hot-Rolled and Cold-Rolled Strips.—The decline in the past week in the hoop and band base to 2.40c., Pittsburgh, is expected to bring a revision in prices of hot-rolled strips to the same quotation. Hoops, bands and hot-rolled strips, in recent efforts to stabilize prices, all have been quoted at the same figure. Some makers of hot-rolled strips still are quoting 2.50c. to 2.60c., according to the specifications, but these prices may be said to be passing as a basis of sales. Cold-rolled strips range from 4c. to 4.25c. base. Business still is spasmodic, running well one day only to fall away the next.

Hoops and Bands.—The price has settled since last reports to 2.40c. base, Pittsburgh, but this seems to be more of a quotation than a selling price, as mills which ordinarily make no effort to secure cooperage or band business now are competing actively with those which always have catered to this trade. Reports are current that some business recently was done at 2.30c. base.

Cotton Ties.—The August price is 1.36c. per bundle of 45 lb., this being the July price plus 1c. a bundle per month, the carrying charge. Demand still is light and although rollings were much curtailed, they promise to be quite ample for this year's requirements.

Iron and Steel Pipe.—There is gradual improvement in the demand upon the mills from jobbers of merchant pipe, but trading between jobbers has not entirely ceased and the orders going to the mills do not yet reach a volume that is at all satisfactory. It is evident that a good many of the current orders are being supplied from mill stocks, as plant operations do not exceed 30 per cent of capacity. Oil country goods still are very slow of sale. There is general adherence to the July 7 price card, except possibly in the case of line pipe, in which manufacturers who want business are obliged to compete with the oil companies having a surplus supply which they are anxious to dispose of. Discounts are given on page 305.

Boiler Tubes.—A slightly better demand is noted for lap welded steel tubes, but there still is considerable

room for improvement, which is not expected to develop until the railroads are better off financially. Seamless tubes are finding such a limited demand that makers still are withholding quotations. Discounts are given on page 305.

Steel Skelp.—Plates and skelp having been placed on the same basis on previous price revisions and owing to the fact that 1.85c. now is maximum on plates, efforts to get more for skelp are proving futile. There is a little better market in both pipe and tubes, but the increase as yet has not been sufficient to create much demand for skelp.

Wire Products.—Rather more business is being done than was the case recently, but all makers are not sharing alike in the improvement. Some companies still report business as extremely slack. Manufacturers willing to guarantee buyers against a decline in prices seem to be faring best in the matter of orders, but it cannot be said that there is any pronounced breaking away from the hand to mouth buying policy on the part of jobbers, and because a bushel of grain will buy considerably less wire and fence than a year ago, demand from the agricultural districts is pretty slim. Public quotations on nails and wire are unchanged at \$2.75 per keg and \$2.50 per 100-lb., respectively, but reports of shading on nails are still frequent.

We quote wire nails at \$2.75 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.50 base per 100 lb., Pittsburgh.

Sheets.—The market appears to have settled to 3c. base, for black, 4c. base, for galvanized, and 2.40c. base for blue annealed. These are the quotations of the leading independent manufacturers and while the American Sheet & Tin Plate Co. has quotations about \$5 per ton higher, it is no secret that it is meeting the independent prices on desirable business, or where there is danger of its losing any of its regular customers. Demand for sheets is slowly but steadily expanding and this is finding reflection in a gradual increase in mill operations. The American Sheet & Tin Plate Co. is running about 40 per cent of its sheet mills and independent operations, as a whole, are about the same ratio to capacity. One large Valley sheet maker last week announced a re-establishment of the stabilized bases of 3.50c., 4.50c. and 2.65c. respectively for black, galvanized and blue annealed sheets and another has announced that its minimum prices were 3.25c., 4.25c. and 2.50c. on the three kinds. At the same time, \$5 per ton below the latter prices is being freely quoted and in the Chicago district a price as low as 2.25c. has been quoted on blue annealed sheets by the leading independent of that district. Because there are such wide variations in prices of the different manufacturers, buyers lack confidence and consequently are not inclined to order very far ahead, although a number of them are known to be running pretty low in supplies. Prices are given on page 305.

Tin Plate.—The market still is a limited affair with the demand coming chiefly from manufacturers of condensed milk and tobacco and dry food containers. Even the demand from these sources is below normal and the important outlet for tin plate in perishable food containers and oil cans could increase 100 per cent and still be unsatisfactory. The packers and the oil companies still are carrying heavy stocks of tin plate and are withholding specifications until they have begun to make some inroads on them. Recent quotations of \$5.50 or more, on production tin plate have disappeared and \$5.25 now measures the top of the market. On stock items as low as \$4.75 per base box now is possible.

Coke and Coal.—The Sharon Steel Hoop Co., which blew in its furnace at Lowellville, Ohio, last Saturday, will use by-product coke, presumably from one of the three steel company plants in the Youngstown district. The contract runs for the remainder of the year and is understood to have been placed at about \$2.50, Connellsville base. Otherwise, the situation shows little change. On spot furnace coke the general asking price of bee-hive oven operators is \$3, but there is so little demand that notwithstanding a very limited production, this price is being shaded anywhere from 10c. to 25c. per ton. Larger operators are declining to

take business at \$2.75, on the ground that this means only \$1.70 per ton for coal and that they are able to sell the coal as high as \$2 per ton. Foundry coke is quotable from \$3.75 to \$4 per net ton, oven, generally, but some operators are not inclined to go below \$4.25 to consumers. There is a fair demand for foundry coke, but it is entirely in small lots. The coal market still is inactive and not especially firm, except possibly on slack grade. Owing to the fact that little coal is moving to the lakes, not much is being screened and slack consequently has become pretty scarce. This grade readily is salable at \$1.75 to \$1.90. Mine run grade of steam coal ranges from \$1.50 to \$2.15, the latter for coal from union fields while by-product grade is quotable from \$1.50 for "distress" tonnages to \$2 for fresh production. Gas coal coming chiefly from the union districts is quotable from \$2.25 to \$2.50.

Old Material.—Prices show no material change from those of the past few weeks, but the undertone of the market is a little stronger, due to the fact that slightly heavier steel works operations are reflected in more willingness on the part of the several companies to take in contract tonnages and there is some new buying by some companies which have stocks of desirable material bought at reasonable prices which they do not want to melt. Bids were opened yesterday by the Pittsburgh & Lake Erie Railroad on 25 carloads, or approximately 1000 tons, of old material, and the Pennsylvania Railroad, Eastern Region, August list closed yesterday. In the latter about 22,000 tons of material was offered.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$12.00 to \$12.50
No. 1 cast cupola size.....	15.50 to 16.00
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Parkersburg and Huntington, W. Va.; Franklin, Pa., and Pittsburgh	13.50 to 14.00
Compressed sheet steel.....	9.00 to 9.50
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh dist..	8.00 to 8.25
Railroad knuckles and couplers....	12.50 to 13.00
Railroad coil and leaf springs.....	12.50 to 13.00
Railroad grate bars.....	10.00 to 10.50
Low phosphorus melting stock, bloom and billet ends, heavy plates, 1/4-in. and thicker	15.50 to 16.00
Railroad malleable	11.50 to 12.00
Iron car axles.....	18.00 to 19.00
Locomotive axles, steel.....	17.50 to 18.00
Steel car axles.....	13.50 to 14.00
Cast iron wheels.....	13.00 to 13.50
Rolled steel wheels.....	12.50 to 13.00
Machine shop turnings.....	7.00 to 7.50
Sheet bar crop ends at origin.....	11.50 to 12.00
Heavy steel axle turnings.....	8.50 to 9.00
Short shoveling turnings.....	8.00 to 8.50
Heavy breakable cast.....	13.50 to 14.00
Stove plate	11.50 to 12.00
Cast iron borings.....	7.50 to 8.00
No. 1 railroad wrought.....	12.00 to 12.50

Opposition to Secretary Mellon's Suggestions

WASHINGTON, Aug. 2.—Opposition common to all tax proposals has developed in Congress as the result of the suggestions of Secretary Mellon for revision of the internal revenue laws, and while they may not be accepted in full, it is believed they indicate the trend legislation will take. In addition to protests coming from the country against the proposed flat tax of \$10 on automobiles, there is considerable protest by business interests against the suggested increase of 50 per cent on first-class postage and the 2c. tax on bank checks. The suggestion for elimination of excess profits tax and \$2,000 exemption on corporation income with increase from 10 to 15 per cent on corporation taxes had been anticipated and the former approved warmly by business interests. The House Committee on Ways and Means, which received the suggestions, is now engaged in framing rates and Chairman Fordney hopes to report the bill in two or three weeks.

The annual convention of the Ohio State Association of Electrical Contractors and Dealers was held July 27-28 at Toledo.

Chicago

CHICAGO, Aug. 2.

The past week has brought out further low prices on nearly all steel products. The so-called "official" prices of 1.85c. on plates and shapes and 1.75c. on bars, announced a little more than a week ago, have not held. Prices are erratic and there is no telling to-day what to-morrow's prices may be, gaged by the manner in which competition has been waged during the past week. Steel bars have sold as low as 1.65c., Pittsburgh, shapes at 1.70c., Pittsburgh, and plates at 1.60c. to 1.65c., Pittsburgh. Sheets are now freely offered at 2.25c. base for blue annealed, 3c. base for black and 4c. base for galvanized, all f.o.b. Pittsburgh. Bar iron is \$2 lower at 1.75c., Chicago mill, and this price appears to-day to be the top rather than the bottom of the market. Further low prices have been made on bolts, nuts and rivets. Railroad spikes and track bolts are \$3 per ton lower and tie plates are freely quoted at 2.25c., Chicago, with interest centered in bids this week on 400,000 wanted by the Chicago, Burlington & Quincy Railroad, which may bring out even lower figures. Warehouse prices have been reduced \$3 a ton in line with recent adjustment of mill prices. Extremely low prices have been made in public bids on cast iron pipe, one company quoting \$41.95, delivered, Detroit, on 1500 tons for that city, while the low bid on 275 tons of 16-in. pipe for Milwaukee was \$44.35. A little business has been done in semi-finished steel at the recent reduction of \$3 per ton.

While the Pittsburgh base is usually quoted on inquiries, buyers with a fair amount of tonnage to place have little difficulty in getting Chicago mill prices that compare very favorably with Pittsburgh prices, leaving the freight rate out of consideration. There are many wild rumors of extremely low prices which are difficult to confirm, such, for example, as 1.70c., Chicago, on steel bars. At any rate, there is no apparent bottom to the steel market at the moment, some of the mills having abandoned all effort to get even cost out of their products in the scramble to find a level at which buyers will take hold more aggressively.

The Western Bar Iron Association has come to an agreement on wage rates with the Amalgamated Association of Iron, Steel and Tin Workers, as reported in another column, the workers going back to the 1919-1920 basis, which is about 3 per cent higher than the pre-war rates. The new rates become effective immediately and will reduce costs roughly about 10 per cent.

Railroad Equipment.—Despite the great number of bad order freight cars, inquiries for car repair work are coming very slowly from the railroads. The past week has brought nothing of importance either in inquiries or orders. Those in close touch with the car situation admit the possibility of a car shortage this fall unless something is quickly done to put a large part of the useless railroad equipment in serviceable condition.

Pig Iron.—Lower quotations on nearly all grades of pig iron are appearing in the local market. Foundry iron, silicon, 1.75 to 2.25, has been sold to several consumers within the past week at \$18 furnace, a reduction of 50c. per ton, with No. 1 foundry, 2.25 to 2.75 silicon, at \$18.50. A new price of \$30, Valley furnace, has been quoted on standard low phosphorus iron, making the delivered price \$35.32, Chicago. Jackson County makers of silvery iron have announced an \$8 per ton reduction. [The new prices, effective Aug. 1, will be found in our Pittsburgh market report.] Lake Superior charcoal iron is now available at \$34 and \$35, delivered, Chicago, the higher price being named by the principal makers. There is a slight improvement in foundry iron buying and inquiries are more numerous, indicating that more melters are reaching the bottom of their stock piles. Inquiries range from carload lots to 200 or 300 tons. Consumers, though realizing that pig iron prices are now extremely low, are not interested in speculative buying. Some have stated that they would rather pay a dollar or two more for iron next month or the month after than to buy more iron now than they actually need for week to week requirements.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil.

1.50, delivered at Chicago.....	\$34.00 to \$35.00
Northern coke, No. 1, sil. 2.25 to 2.75.	18.50 to 19.50
Northern coke foundry, No. 2, sil.	
1.75 to 2.25	18.00 to 19.00
Northern high phos.....	18.50 to 19.00
Southern foundry, sil. 1.75 to 2.25.....	26.67
Malleable, not over 2.25 sil.....	18.50 to 19.00
Basic	18.50 to 19.00
Low phos., Valley furnace, sil. 1 to 2	
per cent, copper free.....	30.00
Silvery, sil. 8 per cent.....	32.82

Ferroalloys.—A car wheel company which recently inquired for 300 tons of ferromanganese has not yet bought. Business is not sufficient to test the market, which remains nominally on the basis of \$75, delivered east of the Mississippi River. A recent authorization by an Eastern maker to quote \$72.50, delivered, has been withdrawn, due, it is said, to the expectation that the new tariff, if adopted, may place the market on a firmer basis. Spiegeleisen is not in demand, but is obtainable at \$25, Eastern furnace, with a freight rate of \$10.07 to Chicago. A price of \$71, delivered, for a carload of 50 per cent ferrosilicon, reported last week, stands as the lowest reported figure on this alloy.

We quote 78 to 82 per cent ferromanganese, \$75 delivered; 50 per cent ferrosilicon, \$71 delivered; spiegeleisen, 18 to 22 per cent, \$35.07 delivered.

Plates.—The so-called "official" price of 1.85c., Pittsburgh, on plates is too high to-day to take anything but the very smallest orders. On fairly large lots, which to-day mean anything from a carload upward, prices have ranged from 1.60c. to 1.70c., Pittsburgh. There appears to be as much uncertainty about prices among sellers as among buyers. At the moment there is no bottom, and just how far the mills will be willing to go to find a level at which a greater number of buyers will become interested is a matter for conjecture. The price situation changes almost from day to day. It seems certain that any fairly good-sized tonnage could be bought at 1.80c. to 1.85c., Chicago, prices which have been previously made. Although quotations are being put out on a Pittsburgh basis, the actual competition for business generally results in a price at Chicago mill. The astute buyer can usually place an order on a Chicago base. This situation applies to all finished steel. Jobbers have reduced plates out of stock \$3 a ton.

The mill quotation is 1.60c. to 1.85c., Pittsburgh, the freight to Chicago being 38c. per 100 lb. Jobbers quote 2.88c. for plates out of stock.

Structural Material.—Some of the business in plain material in the past week has been taken at 1.70c., Pittsburgh, and this price appears to be easy of duplication on any fairly good tonnage. The price quoted on small lots is 1.85c., Pittsburgh. A high school building at Omaha, Neb., requiring 1500 to 2000 tons of shapes, will probably be let within the next week, and on a job of this size it is expected some low prices will come out. Among the lettings of the past week are the following:

Viaduct at Racine, Wis., 170 tons, to Worden-Allen Co.
City of Des Moines, Iowa, water works extension, 110 tons, to unnamed fabricator.
East St. Louis, Columbia & Waterloo Railway, 121 tons, plate girder spans, to American Bridge Co.
Zion Co-operative Mercantile Institution, Salt Lake City, Utah, 189 tons, to American Bridge Co.
Orpheum Theater and Office Building, Wichita, Kan., 136 tons, to Christopher & Simpson.
Atlas Life Insurance Co. Building, Tulsa, Okla., 655 tons, to Kansas City Structural Steel Co.

The mill quotation is 1.70c. to 1.85c., Pittsburgh, which takes a freight rate of 38c. per 100 lb. for Chicago delivery. Jobbers quote 2.88c. for materials out of warehouse.

Bolts, Nuts and Rivets.—There has been some fairly good buying of cold-punched nuts by the automobile industry. The Ford Motor Co. last week bought several million nuts and is in the market for a considerable quantity of bolts, there being 750,000 of one size in the inquiry. Some railroad orders are also coming out. All business is being taken at the expense of prices which are low and irregular. In large machine

bolts, some makers have quoted discounts of 70, 10 and 5 per cent off list; on hot-pressed nuts from 5c. to 7c. per lb. off list. Cold-punched nuts are quoted by a leading maker at 4.65c. per lb. off list for tapped and 5c. per lb. off list for blank. Small rivets, 7/16 in. and smaller, are being quoted at 70 and 10 per cent off list by some manufacturers, while going prices for structural and boiler rivets are 2.40c. and 2.50c. per lb., respectively.

Jobbers quote structural rivets, 3.68c.; boiler rivets, 3.78c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60 per cent off; larger sizes, 55 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 55 off; larger sizes, 50 and 5 off; hot pressed nuts, square and hexagon tapped, 52 off; blank nuts, 53.25 off; coach or lag screws, gimlet points, square heads, 60 per cent off. Quantity extras are unchanged.

Bars.—Steel bars have been shaded at least \$2 a ton, sales having been made within the past week at 1.65c., Pittsburgh. The top price to-day for bar iron is 1.75c., Chicago mill, and on a fairly good order this price doubtless could be shaded. Jobbers have reduced their prices \$3 a ton.

Mill prices are: Mild steel bars, 1.65c. to 1.75c., Pittsburgh, taking a freight of 38c. per 100 lb.; common bar iron, 1.75c., Chicago; rail carbon, 1.80c. to 1.90c., mill or Chicago.

Jobbers quote 2.78c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars is 4.20c. for rounds and 4.70c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base.

Sheets.—Sheet mill are now definitely on the lower price basis mentioned in this report last week, namely, 2.25c. for No. 10 blue annealed, 3c. for No. 28 black and 4c. for No. 28 galvanized. For small lots about \$5 a ton above these prices is asked. The low prices have stimulated some business.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices subject to a freight to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.53c.; No. 28 black, 4.65c.; No. 28 galvanized, 3.65c. Hoops and bands, 3.48c.

Rails and Track Supplies.—The Chicago, Burlington & Quincy Railroad will close bids on Aug. 5 on 400,000 tie plates, about 2000 tons. On ordinary lots of tie plates, either iron or steel, the uniform quotation for Chicago mills is 2.25c. per lb., Chicago. Railroad spikes and track bolts are lower, the mill quotation being 2.85c. on standard railroad spikes; track bolts with square nuts, 3.85c.

Standard Bessemer rails, \$45; open-hearth rails, \$47; light rails rolled from new steel, 1.85c. f.o.b. makers' mills. Standard railroad spikes, 2.85c., Pittsburgh; track bolts with square nuts, 3.85c., Pittsburgh; steel tie plates, 2.30c., and steel angle bars, 2.75c., Pittsburgh and Chicago; tie plates, steel and iron, 2.25c., f.o.b. makers' mills.

Warehouse Prices.—Local jobbers have reduced prices \$3 per ton on plates, shapes, bars, hoops and bands, cold-rolled steel bars, all grades of sheets, and 35c. per 100 lb. on structural and boiler rivets.

We quote warehouse prices, f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.38 per 100 lb.; No. 9 and heavier bright basic wire, \$3.53 per 100 lb.; common wire nails, \$3.48 per 100 lb.; cement coated nails, \$2.90 per keg.

Cast Iron Pipe.—Some extremely low prices were brought out in the public opening of bids for 1500 tons of 8-in. cast iron pipe at Detroit. The Lynchburg Foundry Co. was low bidder with \$41.95, delivered. The National Cast Iron Pipe Co., the second lowest bidder, put in a figure only slightly above this. The National Cast Iron Pipe Co. was low bidder on 275 tons of 16-in. pipe for Milwaukee, its price being \$44.35, delivered. These prices are considerably below the figures quoted in the paragraph below, which are for carload lots. Milwaukee will close bids Aug. 10 on 3500 tons of 54-in. pipe; Detroit is in the market for 500 lengths of 6-in. class B, about 100 tons, bids closing Aug. 5. Bids close in Minneapolis this week on 200 tons of 6, 8 and 12 in., and in Saginaw, Mich., on 800 tons of 6, 8 and 12 in. Bids closed Monday in St. Paul on 125 tons.

We quote per net ton, f.o.b. Chicago, ex-war tax as follows: Water pipe, 4-in., \$49.10; 6-in. and above, \$46.10; class A and gas pipe, \$3 extra.

Semi-finished Steel.—There has been a slightly better demand for billets at the new price of \$30, Pittsburgh.

Jobbers quote out of stock 2.59c. on billets, 0.15 to 0.25 carbon, and 2.63½c. on 0.35 to 0.45 carbon.

Old Material.—There is a slightly improved tone in

the scrap market, not so much due to any actual increase in demand from consumers, but to the expectation of the scrap dealers that the present improvement in steel trade, slight though it is, will be steadily maintained, and will therefore result soon in a demand for old material. Within the past week, there has been a little better speculative buying by dealers, but those who have scrap and are not forced to sell are holding their stocks in the expectation of a rise in the market prices. Where transactions have occurred, they have been at prices from 25c. to 50c. a ton above those quoted last week.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$15.00 to \$15.50
Relaying rails	27.50 to 30.00
Car wheels	12.50 to 13.00
Steel rails, rerolling	12.00 to 12.50
Steel rails, less than 3 ft.	11.50 to 12.00
Heavy melting steel	10.00 to 10.50
Frogs, switches and guards cut apart ..	10.00 to 10.50
Shoveling steel	9.50 to 10.00
Low phos. heavy melting steel	13.00 to 13.50
Drop forge flashings	6.00 to 6.50
Hydraulic compressed sheet	6.50 to 7.00
Axle turnings	7.00 to 7.50

Per Net Ton	
Iron angles and splice bars	13.25 to 13.75
Steel angle bars	9.50 to 10.00
Iron arch bars and transoms	13.50 to 14.00
Iron car axles	17.50 to 18.00
Steel car axles	12.50 to 13.00
No. 1 busheling	8.25 to 8.75
No. 2 busheling	5.75 to 6.25
Cut forge	9.00 to 9.50
Pipes and flues	5.50 to 6.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	9.25 to 9.50
Steel knuckles and couplers	10.25 to 10.75
Coil springs	11.75 to 12.25
No. 1 machinery cast	12.00 to 12.50
Low phos. punchings	11.00 to 11.50
Locomotive tires smooth	10.25 to 10.75
Machine shop turnings	3.00 to 3.50
Cast borings	4.50 to 5.00
Stove plate	11.00 to 11.50
Grate bars	9.50 to 10.00
Brake shoes	9.50 to 10.00
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.50 to 12.00
Country mixed	7.50 to 8.00

New York

NEW YORK, Aug. 2.

Pig Iron.—A number of agencies report that as furnaces which they represent are out of blast and have exhausted stocks, they have no iron to sell. They are receiving few inquiries, but agencies representing furnaces that are still in the market report very fair activity. Within the week, sales amounting to 2500 to 3000 tons have been made, the largest being for 500 tons, and inquiries for about 3000 tons are pending. The sales were for foundry iron, nearly all for prompt delivery. One was for delivery over the remainder of the year at about the same as prevailing prices. The price situation shows little change. Reports have been current of eastern Pennsylvania iron being offered for sale at \$19, furnace, but \$20 is apparently the present minimum and sales have been made at higher figures. One reason for the slow delivery of iron in many cases is that furnaces are, as a rule, loading only two days a week and have no labor available on other days.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25 ..	\$24.02 to \$25.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75 ..	23.02 to 24.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25 ..	22.52 to 23.52
Buffalo, sil. 1.75 to 2.25	24.46 to 25.46
No. 2 Virginia, sil. 1.75 to 2.25	29.16 to 30.16

Ferroalloys.—In the last week inquiries for ferro-manganese have appeared from various consumers totalling 700 to 800 tons, but no definite buying is reported yet. Quotations are nominal for both the American and British alloy and it is conceded that demand would bring out lower prices. One representative of a British producer has a limited amount in storage for prompt delivery, for which he is asking \$70, delivered, within a reasonable distance from the seaboard. There are inquiries for a few carload lots of spiegeleisen for which the quotation remains unchanged. There is very little demand for 50 per cent ferrosilicon, nor has there been any business reported in high-grade manganese ore, though there are inquiries for two carloads. Sales are reported as low

as \$62.50 per ton, delivered, and the alloy can be bought as low as \$60. Quotations are as follows:

Ferroalloys	
Ferromanganese, domestic, delivered, per ton	\$70.00
Ferromanganese, British, seaboard, per ton	\$70.00
Spiegeleisen, 20 per cent, furnace, per ton	\$26.00
Ferrosilicon, 50 per cent, delivered, per ton	\$60.00 to \$65.00
Ferrotungsten, per lb. of contained metal	55c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr.	16c. to 16.50c.
Ferrovandium, per lb. of contained vanadium	\$4.50
Ferrocobaltititanium, 15 to 18 per cent, net ton	\$200.00
Ferrocobaltititanium, 15 to 18 per cent, 1 ton to carloads, per ton	\$220.00
Ferrocobaltititanium, 15 to 18 per cent, less than 1 ton, per ton f.o.b. Niagara Falls, N. Y.	\$250.00
Ores	
Manganese ore, foreign, per unit, seaboard	22.00c.
Tungsten ore, per unit, in 60 per cent concentrates	\$3.00 up
Chrome ore, 40 to 45 per cent Cr_2O_3 , crude, per net ton	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr_2O_3 , crude, per net ton	\$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2	55c. to 60c.

Warehouse Business.—Despite the reduction of prices earlier in the month, effective July 29, the warehouses in this district made a second price drop, reducing soft steel bars from 2.93c. per lb. to 2.78c. per lb. This is a correction of warehouse quotations to the prevailing mill price of 1.75c. per lb., Pittsburgh, based on a spread of about \$13 per ton. Structural material is now 2.88c. per lb. as well as plates $\frac{1}{4}$ in. thick and heavier. Hoops are generally quoted at 3.88c. per lb. and bands at 3.43c. per lb. Sheet prices are also down, blue annealed sheets, No. 10 gage, being offered at 3.53c. per lb.; black sheets, No. 28 gage, at 4.25c. per lb., and galvanized sheets, No. 28 gage, at 5.25c. per lb. Dealers in wrought iron and steel pipe report conditions dull. The following prices are now quoted on lap-welded and seamless steel boiler tubes:

Lapwelded Steel Boiler Tubes	
1 $\frac{3}{4}$ in.	+ 6
2 and 2 $\frac{1}{4}$ in.	-12
2 $\frac{1}{2}$ to 3 $\frac{1}{4}$ in.	-26
3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	-32
Seamless steel boiler tubes, cents per ft.: 1 $\frac{1}{2}$ -in., 19c.; 1 $\frac{3}{4}$ -in., 24c.; 2-in., 20c.; 2 $\frac{1}{4}$ -in., 22c.; 2 $\frac{1}{2}$ -in., 26c.; 2 $\frac{3}{4}$ -in., 30c.; 3-in., 33c.; 3 $\frac{1}{4}$ -in., 33c.; 3 $\frac{1}{2}$ -in., 34c.; 3 $\frac{3}{4}$ -in., 37c.; 4-in., No. 10 gage, 43c.; 4-in., No. 9 gage, 47c.	

The foregoing prices represent a 20 to 25 per cent reduction, some items having been reduced as much as 50 per cent. Brass and copper warehouses report no improvement, although mills have resumed operations on half time. We quote prices on page 320.

High Speed Steel.—The market continues sluggish, although some producers report a slight improvement in the number of orders. Prevailing quotations on 18 per cent tungsten are nominal and range from 90c. to \$1 per lb. with some selling at 85c. per lb.

Finished Iron and Steel.—Assertions of a betterment in business sentiment are increasing. Sellers say that their representatives are bringing reports of increased interest on the part of buyers, because of the disappearance of stocks and the active consideration of new projects. It remains that the most tangible fact is the broadening activity of railroad buying, evidenced chiefly in car and locomotive repair work; in fact in some quarters it is believed that railroad buying has taken a turn and that it will be gradually and increasingly better. It also seems that a slight stiffening has occurred in the price situation, due perhaps to the fact that there are less large attractive items for early settlement than there were a few weeks ago. At the moment the fabricated steel outlook is not so bright as it recently promised. The New York Central has distributed repairs for 6500 cars, involving 30,000 tons of steel, and may of course exercise an option to double the amount within a month or two. This business was placed among nine companies: 1500 each to the American Car & Foundry Co. and the Standard Steel Car Co.; 500 hopper cars each to the Buffalo Steel Car Co. and the Youngstown Steel Car Co., and 500 box cars to each of the following: Illinois Car & Mfg. Co., the Ryan Car Co., the Pressed Steel Car Co., the Streator Car Co. and the Haskell & Barker Car Co. The Lehigh Valley has reduced its inquiry from 5000 to 1000 box and hopper cars. The Illinois Central is

inquiring on some 900 car repairs, and the Buffalo, Rochester & Pittsburgh is expected to place 500 to 1000 additional car repairs. The Pittsburgh & West Virginia has placed 250 to 300 car repairs with Koppel Car Repair Co. New fabricated steel work includes an office building in Philadelphia, 1000 tons; a hospital at Hackensack, N. J., 600 tons; a highway bridge in North Carolina, 550 tons; mine head frame, Providence, Pa., 400 tons, and a savings bank, Fifty-seventh Street, New York, 400 tons. The Florida East Coast Railroad has closed on 450 tons of bridge repair work, and the Porcupine Boiler Works, Bridgeport, Conn., will supply 300 tons for a telephone exchange at Stamford, Conn. The Turner Construction Co. will erect a large factory at Avenue A and Seventy-first Street, New York City, for P. Lorillard Co.

We quote for mill shipments, New York, as follows: Soft steel bars, 2.13c.; plates, 2.18c. to 2.23c.; structural shapes, 2.18c. to 2.23c.; bar iron, 2.23c.

Cast-Iron Pipe.—Due to the decline in the price of pig iron and other raw materials the market price of cast-iron pipe is approximately \$5 a ton lower. The city of New York, which withdrew bids for 1500 tons of pipe, has again placed its specifications on the market, bids to be received Aug. 3. We now quote f.o.b., New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Old Material.—There is a slight raise in prices in railroad wrought, clean cast borings and specification pipe, with no declines in prices apparent this week. It would seem as though the market were on the upturn. Feeling is better, though there is not much tangible evidence of improvement. Prices are more stable than they have been for many months. When lists of material to be scrapped are placed before brokers, there is a great uniformity of prices offered, usually not varying more than 25 cents.

Buying prices per gross ton, New York, follow:

Heavy melting steel	\$7.00 to \$7.50
Relaying rails	9.50 to 10.00
Relaying rails, nominal	37.50 to 40.00
Steel car axles	9.50 to 10.00
Iron car axles	16.00 to 17.00
No. 1 railroad wrought	10.50 to 11.00
Wrought iron track	7.25 to 7.50
Forge fire	5.00 to 5.50
No. 1 yard wrought, long	8.50 to 9.00
Light iron	2.00 to 2.50
Cast borings (clean)	4.00 to 4.50
Machine-shop turnings	2.50 to 3.50
Mixed borings and turnings	2.50 to 3.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	8.00 to 8.50
Stove plate	8.50 to 9.00
Locomotive grate bars	8.50 to 9.00
Malleable cast (railroad)	7.00 to 7.50
Old car wheels	10.00 to 10.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	\$16.00 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	14.00 to 15.00
No. 1 heavy cast, not cupola size	13.00 to 14.00
No. 2 cast (radiators, cast boilers, etc.)	9.50 to 10.50

Belgian-American Coke Ovens Corporation

The Belgian-American Coke Ovens Corporation has been formed by a group of American and foreign capitalists to introduce and develop in this country the Piette by-product coke ovens. The company will have a capitalization of \$10,000,000 of preferred stock and 200,000 shares of no par value common stock.

Included among the directors are Thomas F. Ryan, Emile Francqui, president of the Banque d'Outremer and director of the Societe Generale of Belgium; F. S. Landstreet, president, 25 Broad Street, New York; Hector Prud'homme of Brussels, vice-president; Herbert H. Vreeland, associate of Mr. Ryan; Olivier Piette, inventor of the oven; G. H. Walker, president W. A. Harriman & Co.; Adolphe Stoclet, representing Belgian interests; Lambert Jadot, director of the Banque d'Outremer, and William H. Page, general counsel.

Mr. Ryan and Mr. Francqui have been associated for many years in extensive developments in the Belgian Congo. Their attention was directed three years ago to the Piette coke ovens. Mr. Landstreet then went to Belgium and Mr. Piette with his associates visited this country, with the result that the company was formed.

Buffalo

BUFFALO, Aug. 2.

Pig Iron.—There is less movement with local producers than has been manifest this year. Talk of better feeling is general, but certainly orders do not justify any such sentiment. One producer blew in a furnace to accumulate a stock of iron for its own use and a subsidiary located outside Buffalo. Operation for four weeks is planned and conditions at the expiration of that period govern plans beyond that time. A decided dropping off in inquiry is noted—3000 tons with one producer and its sales but 200 tons. Its ruling price is \$22 for silicon 2.25 to 2.75; \$23 on silicon 3.25 to 3.75. Iron freely offered by a steel interest is now moving in carload lots only and \$20 is the base price. Less than 1000 tons was moved by one maker whose prices range from \$19 to \$21 base. Inquiries are for small lots and furnace operation is determined from week to week only.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$20.75 to \$21.75
No. 2X foundry, 2.25 to 2.75 sil.....	19.75 to 20.75
No. 2 plain, 1.75 to 2.25 sil.....	19.00 to 20.00
Basic (nominal)	20.00 to 21.00
Malleable (nominal)	21.00 to 22.00
Lake Superior charcoal.....	36.00

Coke.—Receipt of several inquiries for 500 ton lots has given rise to better feeling. Greater furnace operation is hinted at.

Old Material.—About 500 tons of heavy melting steel has been sold to a large mill interest; the price is understood to have been \$10, with absolute insistence that the material be first grade. Dealers are not anxious for business at this price. With the exception of steel which has weakened through this purchase, prices generally are unchanged from last week.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$10.00 to \$11.00
Low phos., 0.004 and under.....	15.00 to 16.00
No. 1 railroad wrought.....	12.00 to 13.00
Car wheels	13.00 to 14.00
Machine shop turnings.....	5.00 to 6.00
Cast iron borings.....	5.00 to 6.00
Heavy axle turnings.....	8.00 to 9.00
Grate bars	9.00 to 10.00
No. 1 busheling.....	9.00 to 10.00
Stove plate	12.00 to 13.00
Bundled sheet stampings.....	6.00 to 7.00
No. 1 machinery cast.....	14.00 to 15.00

Warehouse Business.—There is a decided increase in the number of orders and inquiries. Prices which have been reduced in conformity with mill announcements, seem to be in favor with the trade and a number of orders have been booked following the receipt of the new schedules. Road work and bridge construction have developed some new business. Structural orders are only fair.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.90c.; plates, 2.90c.; plates, No. 8 gage, 3.50c.; soft steel bars and shapes, 2.80c.; hoops, 3.50c.; blue annealed sheets, No. 10 gage, 3.55c.; galvanized steel sheets, No. 28 gage, 5.55c.; black sheets, No. 28 gage, 4.55c.; cold rolled strip steel, 6.40c.

Finished Iron and Steel.—Improved mill operation marked the beginning of August. Generally orders are more frequent, but little improvement is noted in tonnages. Buyers fully believe drastic price cuts have all been made and that any price adjustments made from now on will be unimportant. Inquiry is on a more definite basis and none is too small to get attention. Buyers are, on the whole, satisfied with present prices. An accumulation of bar orders together with confidence in prospective business brought about the decision to start three open hearth furnaces this week. Demand is more evenly distributed for bars and shapes and a decided betterment is noted in the demand for cold-finished material. Pipe and wire business was better in July than the preceding month. Structural work is quiet. Bids for the J. N. Adam hospital at Perrysburg have been rejected and new ones called for the latter part of the month. A number of bridge jobs in Canada engage fabricators on this side of the border. The customs ruling explained in previous issues of THE IRON AGE is accepted willingly by domestic shippers and the customs officials are understood to

be liberal in their interpretation of regulations which threatened for a time to interfere with Canadian business. A filtration plant for Charlotte, N. Y., near Rochester, requiring 200 tons, is being figured.

Boston

Pig Iron.—Sales the past week were confined to perhaps half a dozen cars of eastern Pennsylvania and Northern furnace and resale iron at prices well above those quoted on round tonnages, and one car of lake charcoal iron at \$35 furnace base. General inquiries include one for 500 tons No. 1 X and 200 tons No. 2 plain, August delivery, from the Saco-Lowell Shops, Boston; 200 tons No. 1 X, August and September delivery, from the Framingham Foundries, Framingham, Mass., and 100 tons No. 2 plain, prompt shipment, from a Pawtucket, R. I., melter. Various brokers have under negotiation possibly an aggregate of 3000 tons. Foundries, however, are in no hurry to purchase because New England meltings during July dropped to small proportions. Eastern Pennsylvania iron is openly offered at less than \$20 furnace for silicon 1.75 to 2.25, and buyers claim Buffalo has been offered on the same basis, although confirmation of actual sales is lacking. The available supply of Buffalo iron is smaller, the largest producer having withdrawn from the market until a time when selling prices are back on a profitable basis. Local Alabama and Virginia prices are purely nominal. Furnaces are unable to compete with eastern Pennsylvania and Buffalo irons due to the disparity in freight rates. Delivered pig iron prices follow:

East. Penn., silicon 2.25 to 2.75.....	\$24.56 to \$27.56
East. Penn., silicon 1.75 to 2.25.....	24.06 to 27.06
Buffalo, silicon 2.25 to 2.75.....	25.96 to 28.96
Buffalo, silicon 1.75 to 2.25.....	25.46 to 28.46
Virginia, silicon 2.25 to 2.75.....	31.08 to 33.08
Virginia, silicon 1.75 to 2.25.....	30.58 to 32.58
Alabama, silicon 2.25 to 2.75.....	32.16 to 32.66
Alabama, silicon 1.75 to 2.25.....	31.66 to 32.16

Finished Material.—The New England Structural Steel Co., Inc., is awarded 106 tons structural for a boiler shop, Cambridge, Mass., 450 tons for a Manchester, N. H., school, 100 tons for the Washington Mills, Lawrence, Mass., boiler house, and 150 tons for the India building, Boston. The Phoenix Bridge Co. will furnish 800 tons for the Manchester, N. H., Amoskeag bridge, and 250 tons for two Boston & Maine R. R. bridges at Inwood, Vt. The American Bridge Co. is awarded 300 tons for a Mystic, Conn., bridge, and the Boston Structural Steel Co., Inc., 400 tons for a Boston municipal building. Contracts uncovered include: Allston, Mass., theatre 300 tons; Pawtucket, R. I. theatre, 600 tons; Ford Co., Green Island, N. Y., plant, 300 tons; Berlin, Me., high school, 144 tons. The bottom price on sheared and boiler plates is 1.85c., f.o.b. Pittsburgh. Buying is confined to carload lots, but aggregate sales are increasing. One eastern Pennsylvania rolling mill, not rolling anything under ½-in., offers bars at 1.67½c. f.o.b. Pittsburgh, but all other mills are holding at 1.75c. and securing better business.

Coke.—Both the New England Coal & Coke Co. and the Providence Gas Co. have reduced their price on spot and contract foundry coke 25c. per ton, from \$10.91 to \$10.66, delivered, where the local freight rate does not exceed \$3.40 a ton. Connellsville oven interests are more active in this market. A limited tonnage was placed early in the week with Connecticut foundries at \$4.25 f.o.b. ovens, but, within the past few days good grade fuel has been offered at as low as \$3.50 and \$3.75 ovens.

Warehouse Business.—Local warehouse prices on refined iron have been lowered 15c. to 25c. per 100 lb., on cold rolled steel 20c., and on soft steel bars, flats, reinforced bars, structural, plates, bands and hoops 15c. Individual orders for iron and steel still run to small lots, but aggregate sales for the week show improvement. Galvanized sheets are 25c. per 100 lb. lower at \$4.75 base for No. 28, and black at \$4.75 base for No. 28, and blue annealed 10c. lower at \$3.78 for No. 10. Demand for sheets is more active, but individual orders continue small. Wire nails are \$3.85 per keg base, as against \$4.10 heretofore, and standard cut nails \$4.50 contrasted with \$5. Hardened steel cut nail prices are

no lower. Standard horseshoes are 50c. per keg lower at \$7 base, and fancy shoes are down as much. Most jobbers quote bolts on a basis of 50 and 10 per cent discount for $\frac{3}{8}$ x 4-in. machine with H.P. nuts, but in some cases this price is shaded another 5 per cent. The market on chain is 25c. to 35c. per 100 lb. lower.

Jobbers now quote: Soft steel bars, \$2.83 per 100 lb. base; flats, \$3.83 to \$3.93; concrete bars, \$2.50 to \$3.10; tire steel, \$4.20 to \$4.70; spring steel, open hearth, \$5.25; crucible, \$11.50; steel bands, \$3.48 to \$3.98; steel hoops, \$4.18; toe calk steel, \$5.25; cold rolled steel, \$4.15 to \$4.65; structural steel, \$2.98 to \$3.13; plates, \$2.83 to \$2.93; No. 10 blue annealed sheets, \$3.73; No. 28 black sheets, \$4.75; No. 28 galvanized sheets, \$5.75; refined iron, \$2.83 to \$4.75; best refined, \$4.75; Wayne iron, \$7; Norway iron, round, $\frac{1}{4}$ -in. to 2 $\frac{1}{2}$ -in., 7.10c. per lb. net; other sizes, 7.75c. base.

Old Material.—A sale of 1000 tons No. 1 machinery cast to a Massachusetts foundry, delivery during August, September and October, at an indicated price of \$16.50 delivered, and scattered sales aggregating possibly 300 tons No. 1 cast to Massachusetts melters at \$16.50 to \$17 delivered are noted. Otherwise the old material market the past week has been dull and firm. An order for 100 tons No. 1 cast at \$16.90 delivered where the freight is \$3, is going begging. Efforts to place heavy turnings at \$2.50 f.o.b. Watertown, Mass., have been unavailing, the best price obtained by the shipper being \$4 delivered. Important dealers report more sounding out of the scrap market by eastern Pennsylvania mills and actual orders are anticipated within the next week or ten days.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 2 machinery cast.....	15.00 to 15.50
Stove plate.....	14.50 to 15.00
Railroad malleable.....	12.50 to 13.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$5.50 to \$6.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought.....	8.50 to 9.00
Wrought pipe (1 in. in diameter, over 2 ft. long).....	6.50 to 7.00
Machine shop turnings.....	2.50 to 3.00
Cast iron borings, rolling mill.....	3.00 to 3.50
Cast iron borings, chemical.....	3.50 to 4.00
Blast furnace borings and turnings.....	2.50 to 3.00
Forged scrap and bundled skeleton.....	5.00 to 5.50
Street car axles and shafting.....	12.00 to 12.50
Car wheels.....	11.50 to 12.00
Rerolling rails.....	9.00 to 10.00

Steel Makers Will Urge Freight Rate Reduction

A conference of steel makers is to be held in New York early in August to formulate plans for a concerted move against existing freight rates. A general reduction in carrying charges on steel of at least 20 per cent is to be asked. Independent makers in a number of districts have come to the conclusion that they are being kept out of the market by reason of high freight rates and if the carriers expect business, they must lower the rates to a point where the delivered price of steel may be made such that it will attract buyers.

Cincinnati

CINCINNATI, Aug. 2.

Pig Iron.—While there is very little activity, there is apparent a disposition on the part of the furnaces not to go below the level of prices below quoted. This was shown during the week when a Chicago interest turned down a firm offer of \$18 on 1000 tons, the operator stating that before selling iron below \$18.50 he would close down. The same disposition is apparently held by operators in other districts, for some of them have been turning down business offered below present schedules. The largest sale reported during the week was one of 250 tons to a West Virginia melter, the iron coming from a Valley furnace. Another lot of 100 tons of malleable was taken by the same interest on the basis of \$20.50, Ironton. A Michigan melter who recently inquired for 3000 to 5000 tons for delivery during the remainder of the year is reported to have bought 500 tons. It is said that he was unable to get a furnace to contract that far ahead at present prices. A sale of 300 tons of low phosphorus to a Michigan melter was made at an unnamed price. Several inquiries for ferro-alloys are before the trade, mostly from railroad equipment companies in the Chicago district. Prices are quotably lower. Jackson county silvery makers have

reduced their prices on silvery irons \$8 a ton, and on Bessemer ferro-silicons \$8.50. Southern iron is available at \$19, Birmingham, and southern Ohio makers are quoting \$20 to \$20.50. Chicago iron is quoted in this territory at \$18.50, furnace, and Valley iron at \$19 to \$19.50. There are no inquiries of size and carload business continues as the customary activity.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$23.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	24.00
Ohio silvery, 8 per cent sil.....	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	22.52
Basic, Northern.....	21.52
Malleable.....	22.52

Finished Material.—The lower prices in effect have apparently stimulated buying. Sales managers of practically all the steel mills, report business as 50% better during July than was the case in June. This applies to practically all finished products. The feature of the week was undoubtedly the placing of approximately 7000 tons of structural material by the Mt. Vernon Bridge Co. for various projects. The 4500 tons for the Ohio State University stadium has been placed with the Cambria Steel Co., and 1500 tons for the Licking River Bridge and 800 tons for bridge work on the K. & M. railway, are reported to have gone to the Steel Corporation. Fabricators are figuring on a number of small jobs and an addition to the plant of the Columbus Forge & Iron Co., Columbus, Ohio will involve 100 tons; while a bridge over the Little Miami River, to be built by the Hamilton County Commissioners, will take approximately 450 tons. Bids on this structure will close Aug. 23, with A. E. Mittendorf, chairman, Cincinnati. A hotel at Middletown, bids for which were opened some time ago, will probably be erected of reinforced concrete and bids are being taken for a structure of this kind. Bids closed on July 29 for a Union Station at Covington, Ky., involving 80 tons, but no award has yet been made. There has been some activity in the sheet market, and several 100-ton orders have been placed. Prices are holding at 2.25c. for blue annealed; 3c. for black, and 4c. for galvanized. It is reported that several carloads of nails have been placed at \$2.50 per keg Pittsburgh, but confirmation is lacking. The Big Four will likely place orders for 2500 tons of tie plates within the next 10 days. A large number of bids have been received and these are now being tabulated. An inquiry for 900 tons of plates for a Louisville manufacturer is still pending.

Old Material.—Some dealers profess to see a better tone to the scrap market. Some small sales were reported during the week. It is beginning to be the general opinion that the bottom of the price situation has been reached, and that the up-turn will be in evidence in about 30 days. The Pennsylvania Lines West and The New York Central Lines will close lists this week. No price changes are noted.

We quote dealers' buying prices:

Per Gross Ton	
Bundled sheets.....	\$4.00 to \$5.00
Iron rails.....	11.00 to 12.00
Relaying rails, 50 lb. and up.....	25.00 to 26.00
Rerolling steel rails.....	10.00 to 11.00
Heavy melting steel.....	8.50 to 9.50
Steel rails for melting.....	9.00 to 10.00
Car wheels.....	11.50 to 12.50
Per Net Ton	
No. 1 railroad wrought.....	8.50 to 9.50
Cast borings.....	2.00 to 2.50
Steel turnings.....	1.00 to 2.00
Railroad cast.....	11.00 to 12.00
No. 1 machinery.....	12.00 to 13.00
Burnt scrap.....	6.50 to 7.50
Iron axles.....	15.00 to 16.00
Locomotive tires (smooth inside).....	8.50 to 9.50
Pipes and flues.....	4.00 to 5.00

Coke.—With the exception of an inquiry for 2200 tons from a western sugar maker, there is little activity in the coke market. Prices are, if anything, softer, Connellsville furnace being quoted at \$2.75 to \$3 and foundry \$3.75 to \$4.50. No changes have been made in the Wise County and New River schedules. By-product furnace coke is quoted at \$5, and foundry at \$6.50, Connellsville basis.

Warehouse Business.—Small orders for immediate shipment is the prevailing activity. Local warehouses will reduce their prices approximately \$3 per ton to

correspond to the recent reduction made by the mills. This reduction is expected to be made on Wednesday of this week.

Iron and steel bars, 3.15c. base; hoops and bands, 3.85c. base; shapes, 3.25c. base; plates, 3.25c. base; reinforcing bars, 3.22½c. base; cold rolled rounds, 1½ in. and larger, 4.75c.; under 1½ in. and flats, squares and hexagons, 4.75c.; No. 10 blue annealed sheets, 3.85c.; No. 28 black sheets, 4.02c.; No. 28 galvanized sheets, 5.92c.; wire nails, \$3.50 per keg base; No. 9 annealed wire, \$3.10 per 100 lb.

Birmingham

BIRMINGHAM, ALA., Aug. 2.

Pig Iron.—No large business developed in the Birmingham iron market the past week. Competition for the small lots for prompt shipment brought the market more clearly to a \$19 base toward the close of the week. Some car lots are still bringing \$20, but \$19 can be done on 100 tons and up. One sale of 150 tons of 2.75 to 3.25 silicon at \$19.50 was reported by well-informed operators. This is a base of \$18.50 with accustomed silicon differentials. The latter have little remaining standing. The feature of the week was the announcement that the Woodward Iron Co. will blow in a second stack at Woodward before this week ends. President Crockard said: "We will blow in another stack because we have no iron on yards. There are not over 600 to 700 tons between blast furnace and yards. To remain in the iron business and accommodate our customers, we are forced to resume at a second stack. I believe we have turned the corner and that there will be a substantial outward movement of pig iron by the middle of September." The Woodward Iron Co. enjoys the distinction of having the only active merchant stacks in Alabama at this time. Undoubtedly yard stocks have decreased during the past month. In spite of the unsatisfactory volume of business, furnace operators are more optimistic than in many months. But for desire to realize cash, there would be no \$19 iron. Last week inquiry was not notable and sales were confined to the noncompetitive South.

We quote per gross ton f.o.b. Birmingham district furnace, as follows:

Foundry, sil. 1.75 to 2.25.....	\$19.00 to \$19.50
Basic	18.00 to 18.50
Charcoal	35.00

Finishing Mills.—The Tennessee company's operating schedule is the same as for the past six weeks with exception of doubling production at the tie-plate mill after receiving machinery and speeding up at the new car works. The rail mill is on normal turn and plate mills at Bessemer and Fairfield average two days a week apiece. The total of operations is about 40 per cent. The Gulf States Steel Co. is receiving more new business than in some time and will resume at its blooming mill on Aug. 15.

Coal and Coke.—Demand for coke is intermittent, but is always in car lots and for rush shipment. Prices rule from \$6 to \$6.50.

Cast Iron Pipe.—Little new business came in during the week, but several large lettings are expected in the near future by the high pressure pipe makers. The level is \$40. The sanitary pipe shops are enjoying a fair business at \$40 base. Some pipe is going to the Pacific Coast, the Hammond-Byrd Iron Co. and Bessemer Soil Pipe Co. being the shippers. The movement is by ship out of Mobile. National Cast Iron Pipe Co. and American Cast Iron Pipe Co. have shipped about 1500 tons of high pressure pipe to the Pacific Coast by the same route in the past week.

Old Material.—The scrap market is absolutely stagnant. Consumers are most conspicuous by their absence. A fair amount of cast scrap is moving. The price list is nominal.

We quote per gross ton f.o.b. Birmingham district yard as follows:

Steel rails	\$10.00 to \$11.00
No. 1 steel	9.00 to 10.00
No. 1 cast	15.00 to 16.00
Car wheels	15.00 to 16.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	13.00 to 14.00
Stove plate	9.00 to 10.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

St. Louis

ST. LOUIS, Aug. 2.

Pig Iron.—The sale was reported this week of 200 tons of Northern foundry iron to a stove factory at Quincy, Ill., for prompt shipment, the price not being divulged. Several lots of 100 tons each were purchased by St. Louis melters. Another local concern that had out an inquiry for 100 tons decided to wait before placing the order. A few orders for carloads were placed during the week. The Commonwealth Steel Co. has an inquiry out for two carloads of ferromanganese.

We quote delivered consumers' yards St. Louis as follows, having added to furnace prices \$2.80 freight from Chicago and \$5.74 from Birmingham:

Northern foundry No. 2.....	\$21.30 to \$21.80
Northern malleable	21.30 to 21.80
Basic	21.30 to 21.80
Southern foundry, sil. 1.75 to 2.25.....	24.74 to 25.74

Finished Iron and Steel.—The first inquiry of importance from the railroads for some time was brought forth this week. It was from the Missouri Pacific for 500,000 tie plates for prompt delivery. For a hotel at Grand and Lindell avenues, St. Louis, an order for 232 tons of reinforcing bars was placed with the Laclede Steel Co. The Terminal Railroad Association placed an order for 350 kegs of track spikes at a price said to be better than 3c., Pittsburgh. The recent declines have not resulted in any increase in inquiries or orders. However, there seems to be a better feeling among the trade. A number of projects requiring structural steel are in process of development. The warehouse business is very light, and recent mill reductions have been met.

For stock out of warehouse we quote: Soft steel bars, 2.87½c. per lb.; iron bars, 2.87½c.; structural shapes, 2.97½c.; tank plates, 2.97½c.; No. 10 blue annealed sheets, 3.62½c.; No. 28 black sheets, cold rolled, one pass, 4.75c.; cold drawn rounds, shafting and screw stock, 4.20c.; structural rivets, 3.77½c. per 100 lb.; boiler rivets, 3.87½c.; tank rivets, 1½ in. and smaller, 60-10 per cent off list; machine bolts, large, 55 per cent; small, 60 per cent; carriage bolts, large, 50-55 per cent; small, 55 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon, blank, \$3.25; and tapped, \$3.00 off list.

Old Material.—Consumers still decline to entertain any proposition and some of the dealers are trying to get mills interested in buying old material to lay down at the prevailing low levels, but without success. It is reported that one of the large consumers recently purchased 1500 tons of heavy melting steel, but this has not been confirmed. The following railroad lists are before the market this week: Pennsylvania System, 4500 tons; C. C. C. & St. Louis, 3000 tons; St. Louis Southwestern, 300 tons.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	\$12.50 to \$13.00
Steel rails, rerolling	12.00 to 12.50
Steel rails, less than 3 ft.	10.00 to 10.50
Relaying rails, standard section ..	28.00 to 30.00
Cast iron car wheels	11.00 to 11.50
No. 1 railroad heavy melting steel ..	9.50 to 10.00
No. 1 heavy shoveling steel	9.00 to 9.50
Ordinary shoveling steel	8.50 to 9.00
Frogs, switches and guards, cut apart	9.50 to 10.00
Ordinary bundled sheet	4.00 to 4.50

Per Net Ton	
Heavy axle and tire turnings	\$5.00 to \$5.50
Iron angle bars	10.50 to 11.00
Steel angle bars	8.00 to 8.50
Iron car axles	17.00 to 17.50
Steel car axles	12.00 to 12.50
Wrought iron arch bars and transoms	12.50 to 13.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	8.50 to 9.00
Railroad springs	9.50 to 10.00
Steel couplers and knuckles	9.50 to 10.00
Locomotive tires, 42 in. and over, smooth inside	8.00 to 8.50
No. 1 dealers' forge	6.00 to 6.50
Cast iron borings	5.50 to 6.00
No. 1 busheling	9.00 to 9.50
No. 1 boilers cut in sheets and rings ..	5.50 to 6.00
No. 1 railroad cast	11.50 to 12.00
Stove plate and light cast	10.50 to 11.00
Railroad malleable	9.00 to 9.50
Agriculture malleable	9.00 to 9.50
Pipes and flues	6.50 to 7.00
Heavy railroad sheet and tank	6.00 to 6.50
Light railroad sheet	3.00 to 3.50
Railroad grate bars	7.50 to 8.00
Machine shop turnings	4.00 to 4.50
Country mixed iron	6.00 to 6.50
Uncut railroad mixed	7.00 to 7.50
Horseshoes	9.00 to 9.50
Railroad brake shoes	7.50 to 8.00

Coke.—A few carload orders for coke are being received, but there is very little business being placed on contracts. There is enough local foundry and home con-

sumption to take care of the output of the Granite City by-product plant. Standard Connellsville beehive foundry is quoted at \$5 ovens, or \$10.04 delivered St. Louis, Granite City by-products meeting this price, while Laclede by-product foundry is quoted at \$11.50 ovens, or \$11.70 delivered in the St. Louis industrial district.

Cleveland

CLEVELAND, Aug. 2.

Iron Ore.—No sales were reported during the week and no new inquiry came out. A Buffalo district consumer released 250,000 tons for shipment, but this did not involve any new buying, as the ore will come from the consumer's own mines and from other mining companies with which it had long-time contracts.

Following the 10 per cent wage reduction made by the Oliver Iron Mining Co. August 1, some of the other mining companies plan further wage reductions this week. With the last reduction, wages of common labor employed in the Steel Corporation's mines have been reduced from \$4.25 to \$3.80 per day. Some independent companies are paying \$4 per day for common labor, but uniform wage scales have about disappeared among the independent mining companies in the Lake Superior district. There was 30,000,000 tons of Lake Superior ore on docks and in furnace yards July 1, according to figures just compiled. This is an increase of over 2,000,000 tons over June 1, in spite of the light shipments of ore and reflects the further decrease in consumption. The gain in the amount of ore on hand July 1 compares with an increase of 240,000 tons June 1 as compared with May 1. The amount consumed in June was approximately 1,470,000 tons, a decrease of over 250,000 tons as compared with May. The June consumption was less than one-third of the amount consumed during June, 1920, consumption during that month being over 4,500,000 tons.

Lake Superior shipments of iron ore during July were 4,047,687 gross tons as compared with 3,600,989 tons during June. The movement to Aug. 1 was 10,418,914 tons as compared with 26,079,111 tons during the same period last year.

We quote delivered lower lake ports: O'd range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.76; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—The market continues very dull. Shipping orders are light and indicate little improvement in the August consumption, although one interest reports a better volume of shipping orders than a month ago. Sales are still limited to small lots. One interest reports orders taken during the week aggregating 1100 tons of foundry iron, mostly in carloads, and other producers sold only a few car lots. Most of the sales were made at \$20 for No. 2, but some of the business was booked at \$20.50. One or two producers are holding firmly to \$20 as the minimum, but others seem more inclined to meet the Valley district price of \$19.50. There are reports of quotations as low as \$19 and if this price has not already been named, it is believed that a round lot inquiry would bring out a \$19 quotation. The only new inquiries reported are one from the American Radiator Co. for 200 tons of foundry iron for its Springfield plant and another for a like amount from a Barnesville, Ohio, consumer. As a result of the long shutdown of many furnaces, a scarcity of certain grades of iron has appeared in some sections. However, other producing centers still have large stocks that include iron of all specifications. Jackson County producers have made another sharp price cut on silvery iron and Bessemer ferrosilicon, reducing the former \$8 a ton and the latter \$8.50 a ton and making some changes in the differentials, particularly in the reduction of differentials on silvery iron.

New quotations f.o.b. furnace are as follows: Silvery iron, 6 per cent, \$25; 7 per cent, \$26; 8 per cent, \$27.50; 9 per cent, \$29.50; 10 per cent, \$31.50; 11 per cent, \$34; 12 per cent, \$36.50. Bessemer ferrosilicon, 10 per cent, \$36.50; 11 per cent, \$39.80; 12 per cent, \$43.10; 13 per cent, \$47.10; 14 per cent, \$52.10.

We quote delivered Cleveland as follows, based on the new freight rate, there being a 56c. switching charge for local iron, a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and \$6.67 from Birmingham:

Basic	\$20.46 to \$20.96
Northern No. 2 fdy., sil. 1.75 to 2.25.	20.50 to 21.00
Southern fdy., sil. 2.25 to 2.75.	28.92
Ohio silvery, sil. 8 per cent.	30.86
Standard low phos., Valley furnace.	36.00 to 36.25

Coke.—There is very little activity in the market. A few car lot sales of standard Connellsville foundry coke are reported at \$4.50 to \$5 per ton. Quotations on other grades range down to \$4.

Bolts, Nuts and Rivets.—The improvement previously noted in the bolt and nut market is holding up, this being largely due to small lot buying by the railroads. The New York Central Railroad took bids Monday on 9000 kegs of track bolts. The price situation is unchanged. While regular quotations are unchanged, these represent the top of the market, concessions of 5 to 10 per cent being made on desirable orders. Local makers continue to quote rivets at 2.75c. for structural and 2.86c. for boiler rivets, but quotations \$2 a ton lower seem common. The rivet market is very dull.

Finished Iron and Steel.—The volume of orders and inquiries increased somewhat during the week and the sentiment in the trade is better. However, orders are only for small lots for immediate requirements. Some plants are operating a little better. The Bourne-Fuller Co. resumed operations in its Upson Steel plant, Cleveland, Tuesday, starting up two open-hearth furnaces. The market is still in a very unsettled condition regarding prices. Some mills seem inclined to adhere to the regular open prices, but desirable orders are still bringing out concessions. It is understood that the 6900 tons of steel bars, plates and structural material recently inquired for by the Mt. Vernon Bridge Co. for the Ohio State University stadium and other work has been divided between the leading interests and an independent mill. However, this business was not placed with the Cleveland sales offices and definite information as to the prices finally quoted is not available here. The price irregularity is most pronounced in plates, which are being freely quoted at 1.75c. with some mills going to 1.70c. A Cleveland mill took two lots of 600 tons each for oil refining work and the Ford Motor Co. has placed an additional 500 tons of light plates with a Valley mill. A moderate volume of steel bar business is coming out with 1.75c. as the generally prevailing price. Quotations on hard steel reinforcing bars are 1.75c., but a good inquiry would probably bring out a lower price. In a reduction of local warehouse prices a 2.40c. mill price has been taken as the basis on hoops, although mill prices on both hoops and bands are irregular. Hot-rolled strip steel is unchanged at 2.35c. to 2.40c. The structural market is quiet. The only new inquiry on which bids have been taken is for 225 tons for three school buildings in Elyria, Ohio.

Sheets.—The demand shows some improvement, but a wide range of prices is being quoted. New low prices of 2.90c. for black and 3.75c. for galvanized sheets have appeared, but the more common quotations are 3c. for black, 4c. for galvanized and 2.25c. for blue annealed. However, a large Valley producer is adhering to prices \$5 a ton higher. One independent mill is quoting the low prices only for immediate delivery and is suggesting to its customers the restoration of the plan of allocating material for future shipment to be billed at prices prevailing at the time of delivery.

Warehouse Business.—Cleveland jobbers have reduced warehouse prices \$3 a ton on steel bars, plates and structural material, following the recent \$3 cut in regular mill prices. Similar warehouse reductions have been made on cold-rolled steel, hoops and bands.

Jobbers quote steel bars 2.64c.; plates and structural shapes, 2.74c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; No. 10 blue annealed sheets, 3.10c. to 3.55c.; hoops and bands, 3.29c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Old Material.—There is a little demand for small lots of scrap from mills for early requirements, but consumers are not inclined to buy material to lay down in their yards. Prices show no change and some of the dealers are inclined to believe that the bottom

has been reached. A Canton mill during the week purchased 2000 tons of heavy melting steel and a Weirton plant some shoveling turnings, the latter at \$8.75. Local dealers report offers of \$7.25 for machine shop turnings for Brackenridge delivery.

We quote per gross ton delivered consumers' yards in Cleveland and vicinity as follows:

Heavy melting steel.....	\$10.50 to \$11.00
Steel rails, under 3 ft.....	11.50 to 12.00
Steel rails, rerolling.....	13.00 to 14.00
Iron rails.....	11.00 to 12.00
Iron car axles.....	18.00 to 19.00
Low phosphorus melting scrap.....	12.50 to 13.00
Cast borings.....	6.50 to 7.00
Machine shop turnings.....	4.50 to 4.75
Mixed borings and short turnings.....	6.50 to 7.00
Compressed steel.....	6.00 to 6.50
Railroad wrought.....	10.00 to 10.50
Railroad malleable.....	11.00 to 12.00
Light bundled sheet stampings.....	3.50 to 4.00
Steel axle turnings.....	8.00 to 8.50
No. 1 cast.....	15.00 to 15.50
No. 1 busheling.....	7.50 to 8.00
Drop forge flashings, over 10 in.....	5.50 to 6.00
Drop forge flashings, under 10 in.....	6.00 to 6.50
Railroad grate bars.....	12.75 to 13.00
Stove plate.....	12.75 to 13.00
Pipes and flues.....	6.00 to 7.00

Philadelphia

PHILADELPHIA, Aug. 2.

It is more difficult to secure pig iron under \$20 base and it would seem that price tendency is upward. Considerable pig iron has changed hands, one seller reporting that the last two weeks in July has resulted in more sales than for any entire month in a year past. A seller who made a price of \$19.50 for No. 2 X late last week has raised his asking price to \$21 for this grade. Buying of a considerable tonnage by a pipe maker who usually senses the bottom of the market has had the effect of halting the downward trend.

More mills are starting up, such as the Phoenix Iron Co. and the Schuylkill Iron Works of the Alan Wood Iron & Steel Co. Two blast furnaces are still contemplating blowing out, in which case the market will be stiffened.

Higher prices are prevailing in the old material trade and mills are finding it more difficult to cover at the lower prices of a few weeks past. The Lehigh Valley railroad is asking for steel for repairing about 5000 steel hopper cars. Promising business in plates for oil storage tanks has not materialized and the market is weaker. The lack of transactions in finished material makes difficult the gaging of market values.

Pig Iron.—There are some indications that not only has the bottom been reached, but that prices are stiffening. For instance, one furnace, which late last week sold some No. 2 X iron for \$19.50, furnace, is now asking \$21 for the same grade. It is stated that if but one more furnace went out of blast, the shortage would be keen and prices tend to rise. Consumption is now probably greater than production. Another factor which stiffened prices was the purchase by a large pipe company of at least 5000 tons in this district, divided among four furnaces, three of them getting 1000 tons each, the fourth securing 2000 tons. Optimism generally prevails, being based for some on a fair volume of actual orders, and for others on sentiment. One seller reports officially: "Sales for the last half of July were heavier than for any previous entire month for a year past." One seller has disposed of 7000 tons in two weeks, chiefly to foundries and pipe makers. Another seller disposed of 800 tons in four lots on Monday, the largest being of 300 tons. Haines, Jones & Cadbury, Inc., Norristown, Pa., has bought 200 tons of 1.75 to 2.25 sil. iron and 100 tons of No. 2 X. A sale of grey forge iron was made at \$20.50, furnace, with freight of \$1.82; copper-bearing low phos sells at \$35.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.35 to \$20.75
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.35 to 22.25
Virginia No. 2 plain, 1.75 to 2.25 sil.	29.74 to 31.74
Virginia No. 2X, 2.25 to 2.75 sil.	30.74 to 32.99
Basic deliv. eastern Pa.	21.25 to 22.00
Gray forge.....	22.00 to 23.00
Malleable.....	22.00 to 23.00
Standard low phos. (f.o.b. furnace)	38.00
Copper bearing low phos. (f.o.b. furnace)	35.00

Ferroalloys.—The rumor persists that a sale of ferromanganese was made at \$68, though this may have been resale material. Scarcity of sales prevents a real test of the market. Some domestic furnaces, however, name \$70 delivered and British material is to be had at \$70 seaboard, though others still quote \$75. Spiegeleisen is quoted at \$26 or \$27.

Semi-finished Steel.—Sheet bars have dropped \$3 per ton to \$32, Pittsburgh, along with the decline to \$30 for rerolling billets and \$35 for forging billets and \$31 for slabs, as mentioned last week. Very few sales have been made in these materials.

Plates.—Plates are soft and sellers freely admit that lower than the 1.85c. price can be done. Inquiries for oil storage tanks have not resulted in orders and many have been withdrawn. Railroad car repair work will demand some. The Lehigh Valley railroad is asking for material for repairing from 4000 to 5000 steel cars, chiefly hopper cars. The Chesapeake & Ohio asks for over 50 tons of plates. New warehouses on the river at Wilmington, Del., will require a small tonnage.

Structural Material.—Prices are not being shaded as extensively as on plates. The price of 1.85c., Pittsburgh, is being named, but attractive tonnages could be purchased for less. About 1000 tons will be required for warehouses on the Delaware River at Wilmington, Del., the Du Pont Engineering Co. having been awarded the contract by the Board of Harbor commissioners at \$1,372,570 for the total construction involved. Of this, \$90,000 will be spent for the fabricated steel. Bids will be opened this week for a bank at Chelsea, Atlantic City, requiring 200 tons of structural steel. The Chesapeake & Ohio railroad asks for 75,000 lb. of angles.

Bars.—The C. & O. asks for 50,000 lb. of steel bars for repair work. There is a present seasonal demand for deformed bars for concrete work. The price of 1.75c., Pittsburgh, is quoted uniformly for both iron bars and steel bars.

Bolts, Nuts and Spikes.—Large bolts are quoted at list less 70 per cent; small bolts at list less 70 and 10 per cent, but it is understood that the Belmont Iron Works recently bought 2500 bolts at a concession from these discounts. The Philadelphia & Reading has been a buyer of a fair amount of material, including bolts, nuts, rivets and spikes.

Sheets.—Blue annealed sheets are quoted openly at 2.40c. and black sheets at 3.00c., which is a slight decline from recent prices. The Alan Wood Iron & Steel Co. started up its sheet mills at fair capacity this week.

Old Material.—Prices are apparently on the upward swing and a much better feeling exists. Mills are being required to pay more for heavy melting steel. One steel plant is now offering \$11 for this grade but is not finding many sellers at this figure, though a few weeks ago would have had no difficulty in obtaining plenty of material. A fair volume of pipe has been sold to a plant in the Lebanon Valley for \$13, delivered. A railroad supply builder has been inquiring for stove plate for three plants, but has found little response at the prices it offers. Both stove plate and borings are scarce. We quote per gross ton, delivered to consumers in the Philadelphia district as follows:

No. 1 heavy melting steel.....	\$11.00 to \$12.00
Scrap rail.....	11.00 to 12.00
Steel rails, rerolling.....	14.00 to 15.00
No. 1 low phos., heavy 0.04 and under	17.00 to 18.00
Car wheels.....	16.00 to 17.00
No. 1 railroad wrought.....	14.00 to 15.00
No. 1 yard wrought.....	12.50 to 13.00
No. 1 forge fire.....	10.00 to 10.50
Bundled sheets (for steel works).....	8.00 to 8.50
No. 1 busheling.....	11.50 to 12.00
No. 2 busheling.....	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use).....	7.50 to 8.00
Mixed borings and turnings (for blast furnace use).....	7.00 to 7.50
Machine-shop turnings (for rolling mill and steel works use).....	7.50 to 8.00
Heavy axle turnings (or equivalent).....	8.50 to 9.00
Cast borings (for rolling mills).....	9.00 to 9.50
Cast borings (for chemical plants).....	No market
No. 1 cast.....	17.00 to 17.50
Railroad grate bars.....	12.50 to 13.00
Stove plate (for steel plant use).....	11.00 to 12.00
Railroad malleable.....	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications).....	12.50 to 13.00
Iron car axles.....	No market
Steel car axles.....	No market

Warehouse Business.—A cut in all lines became effective last week, bars being reduced from 2.90c. to 2.75c., other changes having been made proportionately.

Soft steel bars and small shapes, 2.75c.; iron bars (except bands), 2.65c.; round edge iron, 2.95c.; round edge steel, iron finish, $1\frac{1}{2}$ in. x $\frac{1}{2}$ in., 3.05c.; round edge steel planished, 3.80c.; tank steel plates, $\frac{1}{4}$ -in. and heavier, 2.85c.; tank steel plates, $\frac{3}{16}$ -in., 3.035c.; blue annealed steel sheets, No. 10 gage, 3.65c.; light black steel sheets, No. 28 gage, 1.25c.; galvanized sheets, No. 28 gage, 5.25c.; square twisted and deformed steel bars, 2.75c.; structural shapes, 2.85c.; diamond pattern plates, $\frac{1}{4}$ -in., 4.60c.; $\frac{3}{16}$ -in., 4.785c.; $\frac{1}{2}$ -in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 4.20c.; squares and hexagons, cold-rolled steel, 4.70c.; steel hoops, No. 13 gage and lighter, 3.65c.; steel bands, No. 12 gage to $\frac{3}{16}$ -in., inclusive, 3.40c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 6.50c.; toe steel, 4.50c.

San Francisco

SAN FRANCISCO, July 27.

Pig Iron.—Dullness prevails in this market on the Coast, with actual sales confined to small lots for the most part. No very conspicuous transactions have been reported lately, but a few carlot quantities of good Belgian material changed hands at prices ranging from about \$30 to as high as \$33.50, ex ship, San Francisco. Poorer grades are quite freely offered, without takers. Foundry operations at present are extremely small. Those that are not completely shut down are operating on a very much restricted schedule. Demand for castings is almost negligible.

Coke.—Two inquiries worthy of mention have been made during the past few days, one involving 400 tons of sacked coke for the account of the Mare Island Naval Base. The other is for approximately 200 tons. Beyond these evidences of life, business in coke in this market is very quiet, as might be expected when foundry activity is on such a small scale.

Old Material.—Holders of heavy melting steel are asking about \$9 a gross ton, delivered, but buyers are not disposed to take much active interest. Cast iron scrap similarly is very dull at around \$20 a net ton, delivered, and some foundries are offering at a much lower price.

Cast Iron Pipe.—This market has displayed a softening tendency of late, and prices are being quoted at around \$40, against the former market of \$45. There has been some business in pipe, principally from municipal sources, since private inquiries are sporadic and involve small quantities. Santa Barbara was asking for bids on 200 tons of 6-, 8- and 12-in. pipe. Los Angeles was in the market for 329 tons of 24-in., and Santa Cruz will open bids on Aug. 2 for 93 tons of 8- and 10-in. pipe.

Finished Iron and Steel.—In San Francisco and environs the situation is one of general disruption and inactivity. Labor troubles are still unsettled, especially in the building trade circle. At present, moreover, there is a good deal of talk of a general sympathetic strike tying up all industries, but the probability of its becoming operative is questioned. The marine strike is practically dissolved, and coastwise shipping once more is being resumed, making possible the movement of steel products to various Coast points. This has had the effect of relieving congestion somewhat. But the actual steel market is at this time chaotic. There have been several inquiries and a few sales, but there is no stability to prices. Underbidding has been prevalent. Plates are now around 2c., tidewater, and galvanized sheets 4c., base, Pittsburgh, but these prices can hardly be called a market. Last week 300 tons of sheets were placed for a Los Angeles firm's credit, and an inquiry from the South for 1000 tons of shapes is now pending. A small railroad is understood to be in the market for 2000 tons of each of the sizes 45-, 60- and 70-lb. rails and complete accessories. There is also an inquiry for 100 tons of alloy steel forging billets for S. A. E. specifications, together with some interest shown in concrete reinforcing bars.

The Worth Brothers Steel Co., Claymont, Del., is operating at about one-half of normal capacity, or at the rate of approximately 11,000 tons of finished steel plate a month. Both open-hearth mill and rolling mill are in service.

WORKMEN'S ADAPTABILITY

German Engineers Discuss Qualifications for Blast Furnace, Open Hearth and Other Work

In discussing the processes developed by Dr. Moede, of the Technical High School, of Charlottenburg, Germany, for testing the vocational fitness of industrial workers, especially in the steel industry, Dr. Huettnerhain, and engineers Roser and Daiber of the Verein Deutscher Eisenhüttenleute made further pertinent comment, according to *Stahl und Eisen*, in which the following was emphasized:

"The application of vocational fitness tests will undoubtedly be of importance to steel and iron works. As in the machine industry, the plants require highly qualified and expert labor, the choice of men for which should be made with care, especially as the work is difficult and involves a frequent change of personnel. On account of the attendant heat and dust and other unfavorable sanitary conditions, physical fitness is of greater importance than even in the machine industry. The necessary tests are therefore to be conducted by a physician familiar with industrial conditions in their plants.

"Physical fitness ranks with good physique in importance. The melter at the blast furnace must judge pig iron and slag by appearance and from the manner in which it acts; he therefore requires a sensitive eye for color changes and spark formation. His hearing must be keen as he must judge of the proper conditions by the sound of the cooling water in the tuyeres and also that of the hot blast. In the interests of safety both for workmen and the plant, alertness is requisite, even under the soporific influence of the heat; it requires, furthermore, that he have presence of mind, be free from fear and have the ability to act with speed and directness in the face of danger.

"The requirements are similar for melters at the open-hearth furnaces and converters. The open-hearth furnace operator must judge the temperature by the eye and regulate fuel and air pressure; the operators at the converter judge progress that the metal is making by the gases given off. They also require keen hearing, alertness and presence of mind. The engineer in charge of the blowing engines must be able to judge the condition of the machinery by sound. He must have good eyesight to note signals, also good color sense, coupled with alertness and the ability to act with presence of mind at unexpected alarm.

"The roller in rolling slabs and sheets judges the requisite pressure by the glow of the billet, requiring sensitive eyes for color. In addition alertness and quick reaction to danger alarms are necessary. The latter qualities must be emphasized in wire mills, where the operators must be adept at changing from groove to groove on the rolls. The test here includes manual dexterity.

"Crane operators require above all ears sensitive to sound; also color sense, presence of mind, quick reaction in case of danger. Dexterity is also required in manipulation of control levers. Practical tests for machinists, lathe operators and locomotive engineers are already in use, but for steel workers are still in the empirical stages. In these tests moral development and constructive thinking receive considerable attention."

Engineer Roser shows practical application of tests and points for which applicant for position is marked. For eye test and ability to judge measurement, the following are given: Counting screw threads and gear teeth; distinguishing between right and left threads, judging sizes of drill holes and centering, selecting master keys, selecting taps, bolts, dividing angles and estimating degree, plumbing rods and drawing parallels. Similar tests are made for hearing, functioning of the arms and other members, sense of touch, memory, judgment, fatigue, etc. Engineer Daiber discussed some tests made on applicants at Dortmund.

The Mary furnace, Sharon Steel Hoop Co., Lowellville, Ohio, went into blast July 30, after having been out since the first of the year.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia	\$0.35	St. Paul	\$0.665
Baltimore	0.335	Omaha	0.815
New York	0.38	Omaha (pipe)	0.77
Boston	0.415	Denver	1.35
Buffalo	0.295	Denver (wire products)	1.415
Cleveland	0.24	Pacific Coast	1.665
Cincinnati	0.325	Pacific Coast, ship plates	1.335
Indianapolis	0.345	Birmingham	0.765
Chicago	0.38	Jacksonville, all rail	0.555
St. Louis	0.475	Jacksonville, rail and water	0.46
Kansas City	0.815	New Orleans	0.515
Kansas City (pipe)	0.77		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb. and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/4c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zebs, structural sizes, 1.85c.

Wire Products

Wire nails, \$2.75 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.50 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.50; galvanized wire, \$3; galvanized barbed wire, \$3.40; galvanized fence staples, \$3.40; painted barbed wire, \$2.90; polished fence staples, \$2.90; cement-coated nails, per count keg, \$2.35; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots 67 to 69 1/2 per cent for 1600-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets \$2.65 || Large boiler rivets | \$2.75 |
Small rivets65, 10 and 10 per cent off list
Small machine bolts, rolled threads, 70 and 7 1/2 per cent off list	
Small sizes in cut threads65 and 10 per cent off list
Longer and larger sizes of machine bolts,	65 and 10 per cent off list

Carriage bolts, 3/4 in. x 6 in.;
Smaller and shorter, rolled threads, .65 and 10 per cent off list
Cut threads60 and 10 per cent off list || Longer and larger sizes | .60 and 10 per cent off list |
Lag bolts70 per cent off list
Flow bolts, Nos. 1, 2 and 3 head60 and 5 per cent off list
Other style heads20 per cent extra
Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in.; Smaller and shorter60 and 5 per cent off list
Longer and larger sizes60 per cent off list
Hot pressed sq. or hex. blank nuts	\$4.60 off list
Hot pressed nuts, tapped	\$4.25 off list
C.p.c. and t. sq. or hex. nuts, blank	\$4.60 off list
C.p.c. and t. sq. or hex. nuts, tapped	\$4.25 off list
Semi-finished hex. nuts:	
1/2 to 3/16 in. inclusive U. S. S.80, 10 and 10 per cent off list
Same sizes S. A. E.80, 10, 10 and 10 per cent off list
3/8 to 1 in. inclusive U. S. S. and S. A. E.	70, 10, 10 and 10 per cent off list
Stove bolts in packages80 and 10 per cent off list
Stove bolts in bulk80, 10 and 2 1/4 per cent off list
Tie bolts65, 10 and 10 per cent off list
Track bolts	4c. base

Square and Hex. Head Cap Screws

1/2 in. and under70 per cent off list || 3/16 in. to 3/4 in. | .70 per cent off list |

Set Screws

3/16 in. and under70 and 5 to 70 and 10 per cent off list || 3/16 in. to 3/4 in. | .70 per cent off list |

Rivets

Rivets, 1c. per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs, 25c. extra to buyers not under contract; small and miscellaneous lots less than two tons, 25c. extra; less than 100 lb. of a size or broken kegs, 50c. extra.
All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$42; chain rods, \$42; screw stock rods, \$47; rivet and bolt rods and other rods of that character, \$42; high carbon rods, \$50 to \$54, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.75 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.75 base; 5/16-in., \$2.75 base. Boat and barge spikes, \$3 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, \$4 base per 100 lb. Tie plates, \$2 to \$2.05 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$11.30 per package; 8-lb. coating, 1 C., \$11.60; 15-lb. coating, 1 C., \$14.30; 20-lb. coating, 1 C., \$15.55; 25-lb. coating, 1 C., \$16.80; 30-lb. coating, 1 C., \$17.80; 35-lb. coating, 1 C., \$18.80; 40-lb. coating, 1 C., \$19.80 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.75c. from mill. Refined bar iron, 2.25c. to 2.40c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/4"	50 1/2	21	1/4" to 3/8"	31 1/2	27 1/2
1/4" to 3/8"	53 1/2	27	1/2"	31 1/2	27 1/2
1/2"	58 1/2	44	3/4"	37 1/2	22 1/2
3/4"	62 1/2	50	1 to 1 1/2"	39 1/2	24 1/2
1 to 3"	64 1/2	52			
Lap Weld					
2"	56 1/2	44	2"	34 1/2	20 1/2
2 1/2" to 6"	60 1/2	48	2 1/2" to 6"	37 1/2	24 1/2
7 to 12"	57 1/2	44	7 to 12"	35 1/2	22 1/2
Butt Weld, extra strong, plain ends					
1/4"	46 1/2	29	1/4" to 3/8"	9 1/2	42 1/2
1/4" to 3/8"	49 1/2	32	1/2"	30 1/2	18 1/2
1/2"	55 1/2	44	3/4"	37 1/2	23 1/2
3/4"	60 1/2	49	1 to 1 1/2"	39 1/2	25 1/2
1 to 1 1/2"	62 1/2	51			
2 to 3"	63 1/2	52			
Lap Weld, extra strong, plain ends					
2"	54 1/2	43	2"	35 1/2	22 1/2
2 1/2" to 4"	58 1/2	47	2 1/2" to 4"	38 1/2	26 1/2
4 1/2" to 6"	57 1/2	46	4 1/2" to 6"	37 1/2	25 1/2
7 to 8"	53 1/2	40	7 to 8"	30 1/2	18 1/2
9 to 12"	48 1/2	35	9 to 12"	25 1/2	13 1/2

To the large jobbing trade the above discounts are increased by one point, with extra discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel	Charcoal Iron
1 1/4 in.	21 1/2
2 to 2 1/4 in.	36
2 1/4 to 3 in.	47
3 1/4 to 13 in.	52
1 1/2 in.	13 1/2
1 3/4 to 1 7/8 in.	10
2 to 2 1/4 in.	20
2 1/4 to 3 in.	25
3 1/4 to 4 1/2 in.	27

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Cents per Lb.	
No. 8 and heavier	2.30-2.40	Nos. 11 and 12	2.60
Nos. 9 and 10 (base)	2.40-2.50	Nos. 13 and 14	2.60-2.70
		Nos. 15 and 16	2.70-2.80
Box Annealed, One Pass Cold Rolled		Cents per Lb.	
Nos. 17 to 21	2.70-2.95	No. 28 (base)	3.00-3.25
Nos. 22 to 24	2.75-3.00	No. 29	3.10-3.35
Nos. 25 and 26	2.90-3.15	No. 30	3.20-3.45
No. 27	2.95-3.20		
Galvanized		Cents per Lb.	
Nos. 10 and 11	3.00-3.25	Nos. 25 and 26	3.70-3.95
Nos. 12 to 14	3.10-3.35	No. 27	3.85-4.10
Nos. 15 and 16	3.25-3.50	No. 28 (base)	4.00-4.25
Nos. 17 to 21	3.40-3.65	No. 29	4.25-4.50
Nos. 22 to 24	3.55-3.80	No. 30	4.50-4.75
Tin-Mill Black Plate		Cents per Lb.	
Nos. 15 and 16	2.80-3.05	No. 28 (base)	3.00-3.25
Nos. 17 to 21	2.85-3.10	No. 29	3.05-3.30
Nos. 22 to 24	2.90-3.15	No. 30	3.05-3.30
Nos. 25 to 27	2.95-3.20	Nos. 30 1/2 and 31	3.10-3.40

Non-Ferrous Metals

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin	Lead		Zinc	
	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
July							
27	12.37½	12.12½	26.25	4.40	4.35	4.75	4.25
28	12.00	12.00	26.50	4.40	4.30	4.75	4.25
29	12.00	11.87½	26.50	4.40	4.25	4.70	4.20
30	12.00	11.75	.....	4.40	4.25	4.70	4.20
Aug.							
1	12.00	11.75	26.75	4.40	4.20	4.70	4.20
2	12.00	11.75	26.50	4.40	4.20	4.70	4.20

New York

NEW YORK, Aug. 2.

There is no activity in any of the markets and prices, except those for copper, are fairly steady. Demand for copper is extremely light and prices are lower. The tin market is only moderately active at intervals. The lead market continues quiet and firm. Demand for zinc is still very small and prices are little easier.

Copper.—The sale of speculative and other lots of electrolytic copper in the latter part of July resulted in bringing the whole market down to the lowest level in weeks. A few of the small producers are meeting the market which may be quoted at 12c., delivered, or 11.75c., New York, for August delivery, but the amount of metal sold at these prices is exceedingly small, most consumers having no need to purchase and the volume of exchange holding back most of the foreign demand. Some of the large producers will not entertain business at less than 12.50c., delivered. Some sellers report a slightly firmer market to-day, due to the inauguration of the new month and elimination of a large part of the copper held in weak or speculative hands. Most of the producers of Lake copper are out of the market and it is difficult to quote values, an appraisal being 12c., New York, or 12.25c., delivered, nominal, for early delivery. It is interesting to note that official statistics of exports of refined copper show that with the 11 months ended with May, this year, Germany took about 27 per cent, which compares with 33 per cent of her share of the exports in 1913. Germany now ranks as the largest foreign buyer of American copper and it is also a fact that, of the total taken in the last 11 months, 70 per cent was purchased in the first five months of this year.

Copper Averages.—The average price of Lake copper for the month of July, based on daily quotations in THE IRON AGE, was 12.59½c. The average price of electrolytic copper was 12.46c.

Tin.—For the most part the market has been exceedingly quiet, with the exception of July 27, when a fair business in future shipment of Straits tin was done, amounting to 200 to 250 tons. Consumers were fairly heavy buyers. Because of the bank holiday in London yesterday the market here was quiet and has continued so to-day, with quotations largely nominal. Straits tin is quoted to-day at 26.50c., New York. London quotations to-day are practically the same as those of a week ago, spot standard being quoted at £158 10s., future standard at £160 10s. and spot Straits at £159 per ton. Deliveries into consumption for July are reported as 1525 tons with 1721 tons in stocks on July 31 and 800 tons being landed. Imports for the first seven months of this year are returned at 10,418 tons against 31,613 tons for the first seven months of 1920.

Lead.—There appears to be more disposition on the part of independent sellers to offer lead and the result is that more metal has been offered than current inquiries call for. While the leading interest continues to quote 4.40c., both New York and St. Louis, the outside market is quiet at 4.40c., New York, and 4.20c., St. Louis.

Zinc.—Some prime Western zinc is being offered at 4.20c., St. Louis, or 4.70c., New York, which we quote as the market for early delivery. Demand continues spasmodic and confined to small lots on which most producers in this market quote 4.25c., St. Louis, or 4.75c., New York.

Antimony.—The market is lifeless with wholesale lots for early delivery obtainable as low as 4.60c., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted by the leading interest at 24.50c., f.o.b. plant, in wholesale lots for early delivery, while the same grade from foreign sources can be procured as low as 21c., New York.

Old Metals.—The market is sluggish and values are slightly off. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	11.50
Copper, heavy and wire.....	10.75
Copper, light and bottoms.....	9.80
Heavy machine composition.....	10.00
Brass, heavy.....	6.75
Brass, light.....	5.00
No. 1 red brass or composition turnings.....	8.00
No. 1 yellow rod brass turnings.....	4.75
Lead, heavy.....	3.75
Zinc.....	3.00
Lead, tea.....	3.00

Chicago

AUG. 2.—Copper, lead and spelter are lower. There is almost no demand. We quote Lake copper at 12.75c. in carload lots; tin, 28c. to 28.50c.; lead, 4.30c.; spelter, 4.30c.; antimony, 7.50c. On old metals we quote: Copper wire, 7c.; crucible shapes, 7c.; copper clips, 7c.; copper bottoms, 6c.; red brass, 6c.; yellow brass, 4.50c.; lead pipe, 2.50c.; zinc, 1.75c.; pewter, No. 1, 17c.; tin foil, 18c.; block tin, 20c. All buying prices for less than carload lots.

St. Louis

AUG. 1.—Consumers of non-ferrous metals are doing virtually nothing and the markets are extremely dull. Lead is quoted at 4.20c. and zinc at 4.20c., car lots. We quote Lake copper car lots at 12.73c. to 12.98½c.; tin, 27.36c., and antimony, 5.38½c. On old metals we quote: Light brass, 3.50c.; heavy yellow brass, 5c.; heavy red brass, heavy copper and copper wire, 7.50c.; light copper, 6.50c.; block tin, 20c.; tin foil, 18c.; zinc, 2.75c.; lead, 3c.; tea lead, 2c. aluminum, 9c.

GREAT OUTPUT

Allegheny County Industries Made a New Record in 1920

PITTSBURGH, Aug. 1.—Allegheny county industries in 1920 produced manufactures having a value of \$2,580,915,800, approximately \$680,000,000 more than the value of 1919 products and \$250,000,000 greater than in 1918, when a county record was established, according to figures made public recently by Secretary of Internal Affairs Woodward following completion of a survey of industrial Allegheny by the Bureau of Statistics and Information of the Pennsylvania Department of Internal Affairs. The figures show that there were employed in the county last year 243,333 persons. In 1919 there were 221,621 employed and in 1918 282,458.

Metal production in Allegheny county last year was the greatest in the country, the value being \$1,995,619,300, of which \$1,526,293,900 represented primary metal products. Secondary products were worth \$469,325,400. Iron and steel ingots were worth \$317,653,300. The metal trades last year gave employment to 146,324 persons, who were paid an aggregate of \$279,304,100. Capital invested in metal plants was \$701,083,300. In 1919 metal production was worth \$1,448,495,400. In that year there were 126,479 persons employed who were paid \$202,914,500. Capital invested in 1919 was \$515,624,600.

BELGIAN MARKET DULL

**Economic Union with Luxemburg Opposed—
Prices Continue to Slump—French and
German Competition**
(By Aerial Mail to London)

CHARLEROI, BELGIUM, July 19.—Although the Comité Paritaire appointed by the Belgian and Luxemburg governments has been studying the proposed economic and customs union between Luxemburg and Belgium for more than six weeks very little headway seems to have been made. It is realized that the opening of frontiers would doubtless result in cut-price competition, as the present duty averages 30 fr. per ton on finished steel. Moreover, the danger of increased German competition presents a grave aspect. Should the union come about, it is argued, there is nothing to hinder German capital from moving to Luxemburg and establishing works there, where, under the cloak of Luxemburg enterprises, the Belgian market could be swamped with cheap material.

The recent establishment of the Société Luxembourgeoise pour Entreprises Electriques, a branch establishment of the German Allgemeine Elektrizitaets Gesellschaft, clearly shows that German industry is considering Luxemburg as a field for regaining her position in the world's markets. This would, of course, provide a method for circumventing the 26 per cent export levy on German goods by the Entente.

More Plants Close

The general situation seems to be drifting from bad to worse, with no improvement in sight. More plants have had to close down lately, including the basic steel works of the Cockerill concern, while the Espérance-Longdoz Co. is also contemplating a shut-down of its steel works. A faint ray of hope for a revival of the international iron market is offered by the conclusion of the miners' strike in the United Kingdom. German competition has, for the time being at least, become somewhat less formidable as German mills are stipulating longer terms of delivery, but in prices Belgian producers are still struggling to hold their own.

More and more the conviction is gaining ground that improvement must come from a considerable wage reduction. Industrial circles are estimating that a 50 per cent wage cut will be necessary, but in face of the stubborn opposition of labor, opinion as to the possibility of carrying through a reduction on that scale is somewhat divided. It appears that labor would eventually consent to a substantial reduction provided the Government guarantees a liberal unemployment benefit.

Pig Iron Continues to Slump

The first effects of the removal of control from French pig iron and semi-finished products found expression in desperate efforts by producers to get as much British business as possible before French competition appeared. Quotations for foundry iron were cut to £5 per ton, while £7 was asked a few weeks ago. These low prices were apparently quoted by overstocked producers, since the average prices ruling throughout the past week were £5.10 c.i.f. United Kingdom port.

Blast furnace coke has been reduced to 110 fr., screened coke, to 145 fr. and special grades to 150 fr. Foundry iron No. 3 has receded to 205 fr., basic, to 175 to 190 fr., at furnace. Against these, Luxemburg foundry iron is offered at 195 fr. per ton, f.o.b. Belgian frontier, and Lorraine iron as low as 180 to 185 fr. As a matter of fact, plants are accepting almost any price consumers feel disposed to pay. Germany is offering spiegeleisen, 10 to 12 per cent, at 1825 to 1850 m. per ton. British hematite prices are hardening, latest quotations being £7.5 to £7.10, c.i.f. Antwerp.

Semi-Finished Material Stationary

The change in prices compared with quotations during the last weeks is not considerable. Average quotations on basic Bessemer steel during the past 10 days were as follows:

	Fr. per Metric Ton
Ingots	270 to 280
Blooms	300 to 310
Billets	315 to 320
Sheet bars	330 to 345

Lorraine producers are actively pushing clogged blooms at about 275 fr. per ton.

Finished Material Drops

The slump in prices proceeds almost automatically week by week, bar iron now having passed the 400-fr. level; 385 to 395 fr. is named for No. 2 wrought iron, 385 to 415 fr. for No. 3, and 400 to 405 fr. for soft steel. The latter is offered as low as 379 to 390 fr. for export, f.o.b. Antwerp, while the export quotations for Nos. 2 and 3 wrought iron are 380 to 395 fr. and 385 to 410 fr., respectively. Hoops have slightly recovered from the heavy drop of last week from 625 fr. to 550 fr., a slightly better demand bringing the price to 575 fr. again. The sheet market under the pressure of French and Luxemburg offers showed a weaker tone. We quote basic sheets No. 6. U. S. standard gage for export at 485 to 495 fr., but Lorraine and Luxemburg mills are naming 450 to 460 fr. and 455 to 470 fr., f.o.b. Antwerp, respectively.

Exports of boiler plates to the United Kingdom developed favorably, but are now meeting keen German competition, the Germans cutting Belgian quotations of £13.10 to £14, c.i.f. Glasgow, by 30 to 40s. per ton.

Rail Market Slightly Active

The La Providence company was awarded an Argentine rail order for 8000 tons at a price of 469 fr. per ton and another works is just reported to have booked an order for 10,000 tons of rails at 460 fr., c.i.f. Brazilian port. Generally rail export quotations are from 460 to 475 fr. per ton. The Chilean Government is inquiring for about 1200 tons of tool and spring steel, plates, etc., and other material for its railroads. In the beam market, orders for heavy shapes are particularly sought and mills are accepting offers as low as 380 fr. per ton compared with the ruling price of 400 to 410 fr. There are indications that the wire market may also be affected by the general depression, though prices for nails are maintained at 15s. per cwt., f.o.b. Antwerp, plain bright wire bringing £1.

The Belgian Congo Katanga Railroads have placed an order with inland works for 90 cars of 40 tons each, totaling in value about 3,000,000 fr.

Increased Activity at Youngstown

YOUNGSTOWN, OHIO, Aug. 2.—Valley iron and steel plants are on the heaviest production schedule this week since January, reflecting improved demand. While some manufacturers are inclined to believe the current movement is simply a spurt and will recede, others express the hope that it may be the beginning of the upturn that shall carry the industry back to normal. After being idle since May 24 Mary blast furnace at Lowellville, Ohio, of the Sharon Steel Hoop Co., Sharon, Pa., has been started. The stack made its first cast on Monday of this week. All Bessemer departments of independent interests and the Carnegie Steel Co. are active, 26 of 66 open-hearth furnaces are melting, while 60 of 105 sheet mills in the Mahoning Valley are under power, the largest number since early in the year. Bar mills of the Republic Iron & Steel Co. are being operated after a long suspension. Hoop, band and strip steel production shows an improvement this week.

With the relighting of Mary furnace, seven of 46 stacks in the Mahoning and Shenango Valleys are in blast, two being operated in the Ohio Works battery of the Carnegie Steel Co., two in the East Youngstown group of the Youngstown Sheet & Tube Co. and one each of the Republic company and the Brier Hill Steel Co. The Sharon company has 160,000 tons of ore on hand which is to be worked off. Since the furnace has been suspended the company has purchased its pig iron requirements from Valley steelworks interests. An inquiry which it had put out for 2000 tons of basic has been withdrawn in view of the operation of its own furnace.

PERSONAL

Charles J. Hunter, vice-president and treasurer Wheeling Steel & Iron Co., has been named to succeed John Duncan as president of the company. Mr. Hunter has been associated with the Wheeling Steel & Iron Co. for many years, and has served in practically every capacity from clerk to the highest executive office in the company. Mr. Duncan was tendered a farewell reception at the Wheeling Company Club, Wheeling, W. Va., on July 29, by the former associates and was presented a diamond stickpin. He is to become president of the Illinois Co., a holding corporation with headquarters in St. Louis, controlling coal lands, iron ore mines and railroad lines.

George E. Harris has resigned as general manager of sales of the Falcon Steel Co., Niles, Ohio, in order to engage in the steel business for himself in Detroit,



GEORGE E. HARRIS

and has made connections with some important producers covering practically all lines of steel. He will specialize on strip steel, sheets, tubing, steels of special analysis of carbon and alloy steels. Mr. Harris has spent 30 years in the steel industry, starting as water boy in the Pacific Rolling Mills in San Francisco, of which his father was one of the organizers. A large portion of this time was spent in the operating end of the industry. His last operative job was division superintendent of the Nova Scotia Steel & Coal Co., New Glasgow, Nova Scotia, where he had

charge of the company's forge and axle shop and bar mill. He also served as superintendent of A. Finkle Sons, Chicago, and was associated with other mills in their operating departments. In the sales end of the steel business, he spent several years with the Peter A. Frasse Co., Buffalo, in charge of its steel department and was also director of sales of the Hawkridge Brothers Co., Boston, resigning that position to become associated with the Falcon Steel Co. During the war, he was an approval officer in the finance department of the air service.

Alfred J. Eichler, vice-president Walworth International Co., sailed July 26 on the *Aquitania* for England and the important cities on the Continent. Early in September he plans to leave England for Buenos Ayres, returning to New York by way of other East Coast cities, arriving in New York late in November.

R. K. Swift has resigned from the Ingersoll-Rand Co. after eight and a half years as manager of the New England sales branch office and a previous 10 years as a salesman for that company. He will take a much-needed rest at his camp at East Weymouth, Mass.

J. P. Keene, president and general manager of the Youngstown Tank & Boiler Co., Youngstown, Ohio, has assumed the duties of W. H. Heywood, who has resigned as vice-president and treasurer. A successor will not be elected to Mr. Heywood until the first of next year. Prior to becoming identified with the Youngstown Tank & Boiler Co. 18 months ago, the latter was in the sales department of the Youngstown Sheet & Tube Co.

Joseph G. Butler, Jr., is slowly convalescing from the effects of an accident over a year ago when he was struck by a motor truck near his home in Youngstown,

Ohio. For the past three months he has not been at his office in the Stambaugh Building, Youngstown. His condition has improved, however, to such an extent that he left on Monday of this week for Atlantic City, where he will stop at the Traymore Hotel during August and possibly longer.

Joseph Wolf, president Cincinnati Electrical Tool Co., arrived in New York July 30, having completed a trip through England, Belgium, France and Holland where he visited his selling connections. He found business extremely quiet in his line because of the severe German competition.

Roy Davey, who has been manager of the Detroit branch for the American Bosch Magneto Corporation, has been given larger responsibilities at the main office of the corporation at Springfield, Mass. He is now acting as manager of the manufacturers' trade department.

A. W. L. Gilpin, who has been manager of the Milwaukee branch and assembling plant of the Ford Motor Co., has been promoted to district manager, in charge of branches at Detroit, Milwaukee, Chicago, Cleveland, Cincinnati, Columbus, Indianapolis and Louisville.

Floyd E. Meeks, for the past four years Pittsburgh district manager of the Shepard Electric Crane & Hoist Co., has been transferred from the sales to the service department of the company, with headquarters at Montour Falls, N. Y. Mr. Meeks will have charge of service, erection and repairs. His successor in the Pittsburgh office is W. C. Minier, formerly connected with the Pittsburgh office and who for the past few years has been in charge of the Cleveland office of the company. It is the intention of the company to combine the Cleveland and Pittsburgh offices, with Mr. Minier in charge.

Frank S. Spencer, 1265 Boylston Street, Boston, has been appointed representative of the Witherow Steel Co., Pittsburgh, for the sale of variable section rolled products in the New England district.

H. Voges, Jr., has resigned as vice-president and general manager of the Webster & Perks Machine Tool Co., Springfield, Ohio.

Percy Tetlow has been appointed director of industrial relations of Ohio, being made a member of the cabinet of Gov. Harry L. Davis, a recently enacted State law providing for a governor's cabinet. Mr. Tetlow is a native of Washingtonville, Ohio, and has been very active in labor union affairs.

I. W. Hawes, New Britain Machine Co., New Britain, Conn., automatic screw machines, has returned from a nine months' trip to Europe.

O. K. Carpenter, superintendent New England Steel Castings Co., Springfield, Mass., has resigned to accept a position as salesman for the Electric Steel Products Co., Turners Falls, Mass., steel castings and tools.

Charles E. Hildreth, who recently resigned from the Morgan Grinder Co., Worcester, Mass., has been appointed receiver for the Springfield Screw Machinery Corporation, Fitchburg, Mass.

H. F. Boersma, of The Hague, Holland, sailed from New York July 30 on the *Rotterdam*. He has just completed a trip around the world during which he studied the latest developments in steel building construction. He is prominent in building contracting in Europe, among other things, having built the Peace Palace at The Hague.

Henry Dreses, Dreses Machine Tool Co., Cincinnati, left New York July 30 for a visit to Europe to be gone until early in October.

W. N. Dickinson, for some years identified with the elevator business, including the Otis and Standard Plunger companies, and during the war attached to the Ordnance Department of the U. S. Army, has opened an engineering office in the Aeolian Building, New York, to specialize in the handling of materials.

Appointed Head of Heavy Machinery Industrial Division

WASHINGTON, Aug. 2.—Walter H. Rastall, of Dayton, O., a mechanical engineer and marine draftsman, who has had extensive experience with iron and steel and machinery manufacturing interests and has served in different capacities for the Government, took up his duties last Friday as chief of the heavy machinery division of the Department of Commerce. This is one of the new divisions provided for by Congress recently under the export industries act, and Mr. Rastall was selected for his new position by Secretary of Commerce Herbert Hoover because of the practical experience and broad knowledge Mr. Rastall has in the machinery line.

Born in Burlingame, Kan., Mr. Rastall is 41 years of age, and obtained his primary and preparatory school training in Chicago and at Hebron Academy, Hebron, Me. This was followed by a course of three years in civil engineering with electrical electives at the University of Maine and a course of two years in mechanical engineering with electrical electives at Cornell University. He was given the degree of mechanical engineer in 1904. He also took a course in naval architecture.



WALTER H. RASTALL

Previous to graduation, Mr. Rastall was engaged as a marine draftsman with the Bath Iron Works, Bath, Me., and the Eastern Shipbuilding Co., New London, Conn., and as chief draftsman with the Latrobe Steel & Coupler Co., Melrose Park, Ill. He is a member of the American Society of Mechanical Engineers. His first foreign experience covered the period from 1904 to 1911, inclusive. As resident engineer of the American Trading Co. at Kobe, Japan, Mr. Rastall was responsible for the engineering and commercial features of a business involving the sale of American industrial machinery to Japanese buyers and increased that company's business from practically nothing to \$500,000 annually. The concern represented about 20 American machinery manufacturers, including the Allis-Chalmers Co., the Ingersoll-Rand Co., Henry R. Worthington, Erie City Iron Works and the Jewel Export Filter Co. In this work, Mr. Rastall handled a large variety of equipment, mining machinery, pumping machinery, power plant equipment, gas engines, ice plants, water works, paper mills, cement making machinery, railroad and shipyard supplies, steam engines and boilers and many other lines. He is credited with having installed the first mechanical filter plants used for municipal supplies in China, Korea and Japan, the plant at Kyoto, Japan, being an unusually important undertaking. The largest single contract Mr. Rastall ever took included the building and completely equipping of a plant at Formosa requiring 500 tons daily of sugar cane whose juices were converted into white sugar. This involved the delivery of about 2000 tons of machinery.

In addition to miscellaneous engineering work in the United States, Mr. Rastall was sales engineer for the Worthington Pump & Machinery Corporation from 1913 to 1917. As a war measure, he joined the Bureau of Aircraft Production in March, 1917, as aeronautical mechanical engineer and was given charge of production in the Dayton district, extending from Buffalo to Kansas City.

In October, 1918, the Department of Commerce requested Mr. Rastall to leave the Bureau of Aircraft Production to investigate the markets for industrial machinery in the Far East. This was started at once and has involved visits to practically every port in Asia from Karachi and Bombay to Yokohama, including Ceylon, the Dutch East Indies and the Philippine

OBITUARY

WILLIAM ROBERT PARK, consulting engineer Hancock Inspirator Co., Boston, died July 29 at the Morton Hospital, Taunton, Mass., following an operation. Mr. Park was born in Brooklyn, Aug. 19, 1831. An orphan at the age of ten, he became a helper in a machine shop at North Scituate, Mass. While in his twenties Mr. Park was made superintendent of the Grover & Baker Sewing Machine Co. plant, Boston, and remained with the firm until it dissolved in 1876, when he was made manager Hancock Inspirator Co., Boston. The Government presented him a gold medal for his mechanical achievements. He was a member of the A. S. M. E. He is survived by a daughter and two sons, Charles F. Park, professor engineering department Massachusetts Institute Technology, and W. R. Park, Jr., engaged in conducting a business established at Taunton by his father.

WILSON L. FENN, president Fenn Mfg. Co., Hartford, Conn., special machinery, and one of the incorporators of Taylor & Fenn Co., that city, machine tools, died July 26 at the Charter Oak Private Hospital, Hartford, after a short illness, in his sixty-third year. Mr. Fenn was born at Plainville, Conn. As a young man he was employed by the Pratt & Whitney Co., Hartford. Later he was superintendent Woodward & Rogers, that city, and in 1900 established the Fenn Machinery Co. In 1907, the Phoenix Iron Works and the Fenn Machinery Co. combined under the firm name of Taylor & Fenn Co. In 1914 Mr. Fenn severed his connection with that company and the next year, with his son, formed the Fenn Mfg. Co. He is survived by this son, Wilson A. and a daughter, Mrs. Stephen G. Pierce, Hartford.

WILLIAM PAUL SIEBERT, Jr., Eastern sales manager, the Weirton Steel Co., Weirton, W. Va., died July 29, in Roswell, N. M., where he had gone for his health. He was the oldest son of William P. Siebert, assistant general manager of sales, the Carnegie Steel Co., Pittsburgh, and was born in Pittsburgh about 31 years ago. Prior to assuming the position of Eastern sales manager for the Weirton Steel Co., he had been attached to the Clarksburg and Weirton plants of that company. He had a wide acquaintance in steel and tin plate trade circles.

WILLIAM T. HOFSESS, New York sales representative of the Wallace Barnes Co., Bristol, Conn., spring manufacturer, met death by drowning Monday night, July 25, while in swimming at Lake Compounce, Conn. Mr. Hofsess was born in New York July 25, 1885, and on moving to Bristol entered the employ of the Bristol Brass Co. in 1900, holding the position of assistant superintendent when he left there. In 1916, he entered the sales force of the Wallace Barnes Co., and made many friends among manufacturers with whom he came in contact.

Islands. The trip recently was completed and the report on the investigation is in course of preparation.

Mr. Rastall will study especially the problems connected with the marketing of American heavy machinery throughout the world. It is the view of department officials that the situation in this respect is unusually attractive at this time, owing to the strong nationalistic spirit which the experiences of the war have created in many countries. This spirit, it is pointed out, is manifesting itself particularly in Latin-America and the Far East where the business men have learned the dangers of complete dependence on outside sources for essential industrial supplies. As a result, department officials believe that the potential market for American heavy machinery is promising and the hope is expressed that the work of this new division may be instrumental in the sale of much American equipment of this character in industrializing the less developed countries of the world.

JAPANESE BUYING CONTINUES

Small Orders for Sheets, Structural Material and Rails—German Quality Is Improved—Welded Steel Ship Launched

NEW YORK, Aug. 2.—Purchases from foreign markets, although small, are beginning to be steady and would probably be more numerous if prices were sufficiently lower to compete with European material, c.i.f. foreign ports. German quotations are but slightly affected by the special import barriers against German material erected by various of the allied nations, as such taxes are paid by the German Government instead of the manufacturer or exporter.

Japanese buyers continue to place small orders in the United States, but considerable purchasing of German material is reported, the Japanese claiming that the quality and workmanship is improving. Sheet buying continues, but although the total of recent purchases by Japan in this country is fairly large, practically all purchases have been of black sheets, Nos. 28 to 31 gage, the heavier sheets being placed with British makers, which are not in a position to quote as advantageously on the lighter gages as the American mills. Low prices are insisted upon by Japanese buyers.

One exporter in New York, who recently quoted a price to Japan, based on \$43 per ton, Pittsburgh, for a tonnage of 35-lb. rails, including splice bars, bolts and plates, was informed that a quotation about 15 per cent lower had been received. A bid of 1.65c. per lb., Pittsburgh, on an inquiry for 800 tons of bars to be rolled to specifications was also turned down by a Japanese buyer, who stated that the price was too high. An inquiry is now in the market from Japan for about 430 tons of structural steel for a bridge which will probably be awarded some time this month. One Japanese exporter recently booked an order for about 630 tons of 80-lb. rails for the South Manchurian Railroad.

An inquiry calling for mild steel, wrought iron and wire for use in the construction of a wharf in New Zealand has been received by the Marchand Export & Import Co., 220 West Forty-second Street, New York. All material supplied, however, must be of Canadian manufacture. The Strong & Trowbridge Co., 17 Battery Place, New York, is handling a small order for hollow stay steel.

Electric Welded Ship Launched

An entirely electrically welded ship was recently launched from the yards of the Electric Welding Co., Goteborg, Sweden. The ship, which is 52 ft. 6 in. long with a beam of 13 ft. 1½ in. and a draft of 3 ft. 6 in., is built of steel plates 0.28 in. thick on the bottom and 0.25 in. thick on the sides. Some of the plates are overlapped, while others, particularly those on the sides, are welded edge to edge. It is reported that the welded sides were found stronger and lighter than riveted connections and less plating was required.

New Chinese Iron Mining Company

It is reported from Japan that a bridge, largest in the Orient, is projected across the Sumida River, connecting the Ryogoku railroad station with the Manseibashi elevated railroad station. Actual work on the bridge will not be started until 1925. Arrangements are being made in Shantung for the incorporation of the Yu Tung Mining Co. with an initial capital of \$20,000. The head office of the company will be at Tsinanfu. It is intended to operate deposits of 70 per cent iron ore at Chinkiang. Although the capital stock of the company is small, the recently organized Lishan Coal Mining Co., near Fuchow, formed with a capital of \$50,000, was later increased to \$250,000.

A meeting of the stockholders of the Central Steel Co., National Pressed Steel Co. and Massillon Rolling Mill Co. to consider the proposed consolidation of the three companies will be held Aug. 4, having again been postponed to secure the assent of a greater number of stockholders. The management is desirous of having as nearly as possible a 100 per cent approval of the merger.

STEEL CORPORATION PRICES

Chairman Gary Says Reductions Were Made to Meet Those of Independents

When his attention was called to an article which appeared in the *Wall Street Journal* of Aug. 2, and he was asked to make comment, Judge Gary replied:

"The statement published in the *Wall Street Journal* Aug. 2 concerning prices of steel products is substantially correct, with the modification that our subsidiaries have not made any reductions except to meet the prices of leading independent manufacturers. Prices generally would seem to have reached the low point, as many, if not most, of the manufacturers are at present selling below the cost of production."

The article published by the *Wall Street Journal* is as follows:

The United States Steel Corporation, although making no official announcement of a new price schedule, is meeting the new low prices quoted by independent producers on steel products and appears to be setting the pace in at least one product. Reports of this have been contained in news dispatches for some time and, in the past week, the corporation has sent letters to its customers quoting prices on various products from \$3 to \$10 a ton below the official prices of July 5.

In most cases, the new prices meet the late prices of the independents, but tin plate, which is now quoted at \$5.25 a 100-lb. box (coke), went below the independent level of \$5.50 a box and has forced several of the independents to reduce their quotations. The Steel Corporation's price on tin plate as of July 5 was \$5.75 a box.

Other reductions were in steel bars to \$1.75 per 100 lb. from the July 5 price of \$1.90, in plates to \$1.85 per 100 lb. from \$2, in black sheets to \$3.25 per 100 lb. from \$3.50, and in galvanized sheets to \$4.25 per 100 lb. from \$4.50. These prices, of course, have been quoted by a number of the independents for several weeks.

It may be added that these prices are only for orders involving fairly large tonnages. But it is reported that if orders are sufficiently attractive, an even better price might be made.

Following table gives a comparison of some of the new prices with the prices officially quoted on July 5, on April 13, and with the Industrial Board prices:

	New Prices	July 5	April 13	Industrial Board Prices
Tin plate	\$5.25	\$5.75	\$6.25	\$7.00
Bars	1.75	1.90	2.10	2.35
Plates	1.85	2.00	2.20	2.65
Galvanized sheets..	4.25	4.50	5.00	5.70
Black sheets	3.25	3.50	4.00	4.35

This lowering of prices bears out predictions made by observers of the steel trade that, after July 5, there would probably be no further official cutting of prices, but that prices would be made, as time went on, that would take business.

Reports from various trade centers for the past ten days have pointed out an increase in inquiry for steel products. To take this new business, it is only natural at the present time that lower prices would be made.

Will Help Employees

The McKinney Steel Co., Cleveland, has decided to relieve its employees at the Lake Superior mines of some of their living expenses during their present period of unemployment owing to the shutting down of the mines. No rent will be charged to employees living in company houses, if no work is available for them, and men working on half time will be charged half rent. Doctors' fees, which have been deducted from the men's pay in the past, will be paid by the company. In addition the company will pay charges for water supplied to employees occupying houses that have water piped from the city lines. Where possible, the company is providing a little work for men cleaning up around the mines.

Valley Wages Not to Be Reduced

YOUNGSTOWN, OHIO, Aug. 2.—Valley steel interests plan no wage reduction at present, to follow the reported action of the Cambria Steel Co. in cutting the day labor rate to 25 cents. Independent mills are paying 30 cents for common labor and the Steel Corporation units 37 cents. Johnstown and Eastern centers have uniformly paid less than Youngstown and Pittsburgh districts.

MORE HOPEFUL SIGNS

Youngstown Pleased with Developments— Increased Demand for Some Products

YOUNGSTOWN, OHIO, Aug. 2.—Cumulative evidences strengthen the growing conviction that the steel industry has "turned the corner" and is headed toward more prosperous days. One of the leading independents reports that the volume of inquiries has appreciably increased within the past week for a miscellaneous variety of finished products, and emanating from all parts of the country. Large jobbing interests which have bought cautiously for a number of months are seeking larger tonnages, while manufacturing consumers of steel are more active in the market. Specifications against contracts and new buying have shown considerable new life, resulting in improved mill operations. Following three months of inactivity, the industry enters August with more hopeful signs than have been evident since the first of the year.

Recent sheet business placed in the Valley aggregates in excess of 3000 tons. At its Western Reserve works, near Warren, the Brier Hill Steel Co. has been working off an order for special blue annealed sheets for the Ford Motor Co., under rigid inspection of the buyer's representatives. Rod and wire business placed within the past week with a district maker has enabled the enlargement of production in affected units. A tank and boiler interest has received enough business in the past ten days to increase production to 100 per cent. An inquiry being figured by Valley interests calls for 6800 tons of plates and has been put forth by oil interests at Shreveport, La.

Claiming that ferromanganese is cheaper and may therefore be used more advantageously than spiegeleisen, a steelworks interest operating blast furnaces is in the market for 50 tons of ferromanganese. In view of quotations ranging from \$28 to \$31, furnace, on 20 per cent spiegeleisen, as compared with 80 per cent ferromanganese quoted at \$70 or less delivered, the latter may be substituted.

Prices Still Uncertain

While prices are generally uncertain, it is felt that the bottom has either been reached or is being approached on many finished products, at least until freight charges are revised. While plates, for instance, are generally quotable in the Valley from 1.80c. to 1.85c., a consuming interest states that they are purchasable in the Chicago district at 1.50c. or less, and that Valley makers stand ready to offer substantial concessions to release tonnage. Most of the current buying is for car repair material and for tank building.

More activity is being shown in the sheet market than at any time this year, the product to be used for a variety of purposes. Galvanized for car roofing is in specially strong demand. A producer of full finished has sheets in warehouse for delivery to a large number of automobile makers besides Ford. This particular maker has produced a highly polished sheet that has proved especially successful for auto body stock. Concessions are being accepted on production tonnage from the 4.70c. quotation for No. 22 gage material.

Prices of 3c for No. 28 black and 4c for No. 28 galvanized more fully represent the trend of the market at the present time and it is authoritatively stated that galvanized has been offered by makers in a nearby district at less. While some mills are not openly quoting these prices, they will meet them under the stress of current competitive conditions. An encouraging feature is that consumers in widely scattered sections, some of whom have been out of the market for months, are sending out inquiries.

Bars More Active

Steel bars are displaying more activity, the bulk of the inquiry coming from the automobile trade. A number of 1000-ton inquiries have elicited bids and 1.75c. base has been offered on attractive tonnage. Various motor companies have been negotiating for a total of 9000 tons of bars.

Better tin plate business has been stimulated by

the \$5.50 base price, though this market is still far from normal. Increase in the production rate of American Sheet and Tin Plate Co. mills in the Shenango Valley indicates the placement of larger orders with that interest.

For the time being, pipe is not sharing in the upward movement, though new buying of butt weld sizes for construction is holding its own. One interest is rolling lap weld sizes on an export order.

Foundries are buying pig iron in larger quantities than formerly, though large tonnages of basic are piled in independent yards. The market remains at \$18.50 to \$19, with further liquidation expected to bring lower quotations.

Buying of plain wire and wire rods is showing more strength for the time being and operations are well sustained at 30 per cent. Plain wire at the 2.50c. base is one of the commodities which has apparently escaped the general movement to a lower price level. Wire rods are selling at the \$42 basis of the leading interest.

In the semi-finished market, it is reported that orders impend for an aggregate of 10,000 tons of sheet bars at the quoted price of \$32.

Steel Bridges for Alaska

SEATTLE, July 26.—The Washington Sales Engineering Co. of this city has been awarded the contract for furnishing steel to be used in the construction of five bridges in Alaska to be erected by the Alaska Road Commission. The commission maintains head offices at Juneau, Alaska, although communications can be addressed to and business transacted with local headquarters in the United States Engineers' office here.

Four of the bridges to be erected by the commission will be 100-ft. spans, the other 120 ft. One will be located at Ruby, one at Fairbanks and three at Chitina.

Recently the Washington company furnished steel for two similar spans for the Road Commission which are now under erection at Juneau, and also supplied the steel for a 100-ft. steel bridge at Le Grade, Ore., by the Union Bridge Co.

Belgian bars are offering here at \$1.75 per 100 lb. f.o.b. shipside, but it is reported that there is little interest. Buyers declare that the domestic market has fallen to such an extent that imports will have to be quoted lower to invite any trading.

Jobbers here report that the unsettlement of the steel market is grave. Inquiring from an Eastern mill this week for a car of sheets, the mill replied, "Let conscience be your guide." According to the tenor of the replies from the mills on sheets and plates, it is practically a buyers' market.

Rates for Special Purpose Machines

"Setting Machine Rates for Special Purpose Machines" is discussed in a five-page bulletin, published by the National Association of Cost Accountants, 130 West Forty-second Street, New York. According to the bulletin, "The rate of the regular purpose machine is based upon the hours that the machine has run during a period of normal business activity. When an attempt is made to set a machine rate for the special purpose machine on the same basis, the rate seems too high." The questions then asked are: "Should the question be solved by arbitrarily assigning to the special purpose machine a standard monthly operating time equivalent to the standard monthly time used in connection with the machine rate for the regular purpose machine? Would this procedure penalize the costs of the product made by the special purpose machine, or would it demonstrate that the special purpose machine does not pay for itself?"

Six "answers" to the above questions follow. Concluding, "The consensus of opinion in the answers given is that the cost per hour of running the special service machine should be based on the normal hours that this machine is supposed to run for the special purpose intended, even though it runs only two or three hours a week. Since this machine is purchased for a specific purpose, it would seem logical that the carrying out of this purpose should stand the cost."

IRON AND INDUSTRIAL STOCKS

Prices Irregular but Generally Slightly Higher During the Past Week

In a few instances stocks displayed weakness the past week due to certain conditions surrounding the individual issues. Iron and industrial securities in general, however, have ruled slightly higher because of broader constructive developments. For instance, the omission of the \$2 quarterly dividend on Pressed Steel Car Co. common stock caused some holders to sell out, and certain owners of Railway Steel Spring shares unloaded in sympathy, yet the equipments as a group held closely in view of indicated improved business. General Electric was sold freely on reports of comparatively poor business, people evidently forgetting the strong financial condition of the company. On the other hand, the quarterly earnings statement of the United States Steel Corporation stimulated a demand for the common shares, investors feeling the bottom in the steel industry depression practically has been reached and that gradually improving conditions are before the steel industry as a whole.

At best the market has been irregular, yet mostly higher. The better feeling in banking and business circles to a large extent is based on money market conditions. Money for the first time in two years really is plentiful as loaning rates indicate. Commercial paper is moving in larger volume than it has before in many months. Bond issues are absorbed as fast as appearing on the market, regardless of size. General industry has liquidated, although in particular instances it is not completed. Manufacturing plants have remained idle or have operated on reduced schedules sufficiently long to have created a real demand for certain products, at least.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com.	31 - 32	Nat.-Acme	14 1/2 - 15 1/4
Allis-Chalm. pf.	- 73	Nat. E. & S. com.	46 - 48
Am. Can. com.	26 1/4 - 28 1/4	N. Y. Air Brake.	55 - 57
Am. Can. pf.	81 1/4 - 82	Nova Scotia Steel	- 23
Am. C. & F. com.	122 1/4 - 127 1/4	Pittsb'gh Stl. pf.	79 3/4 - 80
Am. Loco. com.	79 1/2 - 85	Pressed Stl. com.	56 - 74 1/4
Am. Rad'tor com.	68 3/4 - 69	Pressed Stl. pf.	- 85
Am. Stl. Fy. com.	25 1/4 - 26 3/4	Ry. Stl. Sdg. com.	67 - 83 1/4
Am. Stl. Fy. pf.	80 1/2 - 80 3/4	Ry. Stl. Sdg. pf.	- 100
Bald. Loco. com.	77 - 80 1/2	Replogle Stl.	- 20 1/2
Bethl. Stl. com.	- 47	Republic com.	45 3/4 - 47 1/4
Beth. Stl. Cl. B.	47 3/4 - 50 1/2	Republic pf.	- 84
Beth. Stl. 8% pf.	98 1/2 - 99	Sloss com.	35 - 36
Chi. Pneu. Tool.	50 - 50 1/4	Superior Stl.	- 30
Colo. Fuel	22 - 26	Transue-Williams.	31 1/2 - 32 1/4
Cruc. Steel com.	54 3/4 - 56 1/4	Un. Alloy Stl.	25 - 25 3/4
Gen. Electric.	116 - 123 1/4	U. S. Pipe com.	14 1/2 - 15
Gt. No. Ore Cert.	27 1/4 - 27 3/4	U. S. Pipe pf.	- 44 1/2
Gulf States Stl.	- 32 1/2	U. S. Steel com.	73 - 74 3/4
Int. Har. com.	70 3/4 - 75	U. S. Steel pf.	109 1/4 - 109 1/2
Int. Har. pf.	99 3/4 - 100 3/4	Vanadium Steel.	28 - 29 1/4
Lackawanna Stl.	37 1/2 - 39	Westingh'se Elec.	41 3/4 - 44 1/4
Midvale Stl.	23 1/4 - 23 1/2		

Industrial Finances

The Holyoke Valve and Hydrant Co., Holyoke, Mass. has increased its capitalization from \$50,000 to \$100,000 and declared a 100 per cent stock dividend to apply to undivided surplus earnings.

The Otis Steel Co. stockholders are being asked to approve a \$15,000,000 mortgage bearing not more than 8 per cent interest, of which \$5,000,000 will be issued within the near future to refund outstanding obligations, to provide working capital, etc.

The Six Wheel Truck Co., Fox Lake, Wis., recently incorporated, is now floating a loan for \$50,000 for the erection of a building for assembly work, and expects to be in the market for equipment about the first of the year.

The Standard Pulley Co., Cincinnati, manufacturer of pulleys, and operating a foundry and machine shop, has been placed in the hands of a receiver through an application of its president, J. H. Jewett. The company is financially sound, but, on account of the present business depression, is having difficulty collecting its outstanding accounts. The property will be operated by Mr. Jewett, who has been named as the receiver.

For the year ended Dec. 31 the Sharon Steel Hoop Co. reported net profits, after charges and Federal taxes, of \$693,861, equivalent to \$2.61 a share at \$50 par value, earned on the 265,746 shares of outstanding capital stock. Net earnings from operation amounted to \$2,115,395.

An involuntary petition in bankruptcy has been filed against the Pfau Motor Pump Co., 829 Forest Home Avenue, Milwaukee, Wis., by the M. J. Walsh Machinery Co., F. R. Dengel Mfg. Co. and the Western Iron Stores Co., all of Milwaukee. Oscar C. Schwemer, Pereles Building, has been appointed receiver.

Directors of the Pressed Steel Car Co. have deferred

action on the regular quarterly dividend of 2 per cent on the common stock due at this time. The regular quarterly dividend of 1 1/4 per cent was declared on the preferred stock, payable Aug. 30, to stock of record Aug. 9. It was stated after the dividend meeting that the common stock disbursement was deferred on account of business conditions and uncertainty as to the future.

Bethlehem Business Improves

New business taken by the Bethlehem Steel Corporation in the second quarter of the year showed a great improvement over the first quarter, according to Eugene G. Grace, president, in a statement issued July 28 after the quarterly meeting of the board of directors.

The directors declared the usual quarterly dividends of 1 1/4 per cent on both classes of common stock, payable October 1 to stockholders of record September 15. The dividend on the common was more than earned for the entire six months' period, Mr. Grace said.

"The value of orders on the corporation's books as of June 30," he said, "is \$84,000,000, compared with \$110,000,000 March 31. Although the amount of new business booked during the quarter was \$26,000,000 less than the billings, it showed a marked increase over the first quarter. This would indicate that the low point had not only been reached, but actually turned, and that a gradual increase in the volume of business is to be expected. Railroad and railroad supply and equipment company buying is estimated to represent anywhere from 35 to 50 per cent of the demand of the steel industry. It is, therefore, believed that just so soon as the railroads are in position to enter the market a definite and substantial improvement will be noted in the steel business.

"With steel prices relatively at the lowest point in 20 years, it is evident that the steel interests have done their full share in liquidating values to a point where business should go forward, provided other conditions are similarly adjusted."

Standard Parts Co. Finances

Frank A. Scott, receiver of the Standard Parts Co., Cleveland, has issued a report of the company's operations and finances for the period from March 1 to June 30, in which he states that he has a cash balance of \$1,538,219, out of which he made application for authority to pay a dividend of 10 per cent upon the indebtedness of the company. The receiver's report shows that during the four month period gross sales were \$3,321,087 and that the loss for the four months, after all allowances for depreciation, etc., amounted to \$129,521. Disregarding the item of depreciation the company's plants were operated at a profit of \$126,447 during the period. The receiver stated that it was felt that the company had gone through its worst and that while the future may be uncertain, there will be business enough to admit of successful operation. During the four month period, business was booked by different units of the company in the following amounts: Standard Welding division, \$1,500,000; Perfection Spring division, \$600,000; Eaton Axle division, \$1,565,000; Pontiac Spring division, \$1,400,000.

Plans of New Companies

The Marcy Tool Works, Putnam, Conn., recently incorporated, has taken over the business established and conducted by A. W. Marcy, under the name of the Marcy Tool Works. Its intention is to enlarge the line of production and provide additional equipment and working capital as increasing business may require, although no new buildings or equipment are contemplated immediately. Wood turning equipment may later be installed to manufacture tool handles. The company is now and has been continually operating full time during the present business depression, and believes that the benefits of incorporation will materially strengthen its position to take care of the increased demand of normal times. The personnel of the corporation is as follows: A. W. Marcy, president and treasurer; M. C. Marcy, vice-president and secretary, and Helen E. Devine, assistant secretary and treasurer.

The Koffee Saver Mfg. Co., 18 West 18th Street, New York, recently incorporated with a capital of \$100,000 to manufacture metal coffee urns and kindred products, does not expect to start manufacturing until fall.

The Dow Co., Louisville, Ky., formerly the Dow Wire & Iron Works, recently increased its paid-up capital from \$100,000 to \$300,000. It is spending about \$30,000 putting in a new Grinnell sprinkler system and other improvements.

The Fairfield Metals Co., Inc., 342 Madison Avenue, New York, recently organized to manufacture iron, steel and other metal castings, will have its work done by contract and is not in the market for equipment.

Machinery Markets and News of the Works

REDUCTIONS MADE

Prices Cut from 20 to 35 Per Cent on Attractive Business

Considerable Activity in New England, But Chiefly in Used Tools

The price reductions made when attractive business is in sight are the feature of the week. Prices were cut from 20 to 35 per cent last week when the Illinois Central purchased about 50 machines for about \$150,000, dividing up the orders among several houses. The McKinley School, Canton, Ohio, received bids July 29 for about 25 tools, discounts of as high as 20 per cent having been offered, whereas the usual discount to schools is about 5 per cent.

The Central Railway of Georgia has bought about 10 machines. The contemplated purchases of the Rock Island and Santa Fe have been postponed until probably fall. The most optimistic reports come from New

England where more tools have been sold than in many weeks, though these were mostly used tools. Here there is an improved demand for cylindrical grinding equipment from the automotive interests. The first export business for some time from this district was the sale of about six tools to a machine shop in Cuba. One New England house is about to close for \$25,000 worth of machine tools.

July proved to be practically no better than June. A few builders in Cincinnati closed their plants July 30 for an indefinite period, though several of the larger ones still operate. An auction sale of about 100 tools will be held Aug. 4 at the plant of the Industrial Research Corporation, New Haven, Conn.

The Jones & Lamson Machine Co. has reduced prices on lathes about 15 per cent.

The United States exported the greatest value of metal-working machinery in June to Japan, according to a report of the Department of Commerce. This totaled \$599,419. France was second, with \$161,900, while British India was third with \$115,519.

New York

NEW YORK, Aug. 1.

The Central of Georgia Railway Co. has purchased about 10 tools, including a shaper, boring mill, radial drill, car wheel lathe and drive wheel lathe. The Brunswick Refrigerating Co., New Brunswick, N. J., has bought some tools, including grinders, and will buy more, its equipment consisting of engine lathes, turret lathes, boring mills and grinders, etc. A sale of two turret lathes was made to a manufacturer of automobile locks in New Jersey.

One current inquiry includes a 42-in. lathe and a 48-in. planer. It is rumored that the machine tools in a large plant in Long Island City, engaged in making airplane motors during the war, will be sold. More demand is noted for used tools than for new. Business is at a low ebb, with no immediate prospects of improvement.

The Jones & Lamson Machine Co. has reduced its quotations on lathes 15 per cent.

From the standpoint of inquiries there is some activity in the crane market, but sales still continue few. Quotations are as a rule low and competition keen. Among current inquiries is one from the Virginian Railway, Norfolk, Va., for a 10-ton, 73-ft. span overhead traveling crane for an engine house at Elmore, Va. The Centre Iron Works, 608 East 137th Street, New York, is receiving quotations on a 5-ton, 50-ft. span overhead traveling crane and the New Haven Boiler Works, New Haven, Conn., is in the market for a 10-ton overhead traveling crane.

Bids on the 12-ton hand power crane for the Government of Porto Rico were opened in New York, but will be passed upon in Porto Rico. The lowest quotation was submitted by the New Jersey Foundry & Machine Co. through Fox Brothers, New York. The Arrington Engineering Co. quoted \$1,320 and Manning, Maxwell & Moore \$1,338 on a Shaw crane.

Among recent sales are: Shepard Electric Crane & Hoist Co., eight 3-ton, stationary type electric hoists to the York Mfg. Co., York, Pa., and a 3-ton, 23-ft. 3-in. span, single I beam crane to Weil McLain, Michigan City, Ind.; the Pawling & Harnischfeger Co., a 10-ton, 51-ft. span and a 5-ton, 21-ft. 9½-in. span overhead traveling crane to the Hendricks Mfg. Co., Carbondale, Pa.

M. Cohn & Co., Inc., manufacturer of corset steels, 218 West Twenty-sixth Street, New York, has awarded contract to the White Construction Co., Inc., 95 Madison Avenue, New York, for a new three-story and basement factory, 100 x 160 ft., at Evergreen Avenue and Cook Street, Brooklyn, at a cost of about \$200,000. Russell G. Cory, engineer, prepared the plans.

The H. W. Sweet Shipyard & Machine Works, Inc., Greenport, N. Y., has been incorporated with a capital of \$75,000 by H. W. Sweet, F. B. Corey and C. W. Thorn to operate a shipbuilding plant and general machine construction and repair works. It is represented by H. L. Fordham, 111 Broadway, New York.

The United States Sand Blast Mfg. Co., New York, has been chartered under State laws to manufacture sand blast equipment. The incorporators are W. Danzelsen, W. Fischer and H. Greenblatt. It is represented by P. E. Jackson, 302 Broadway.

The Hoffman Enameling Corporation, Brooklyn, has been incorporated with a capital of \$25,000 by P. H. Hoffman, B. C. Sprague and A. V. Maday, to manufacture enamelware. It is represented by Murray, Hollaman and Lockwood, 66 Broadway.

The Handy Machine Tool & Engineering Co., New York, has been chartered under State laws to manufacture tools and other mechanical products. The incorporators are A. and R. Friedman and H. Rubin, 302 Broadway.

J. Charles Teepe, Inc., 15 Wilbur Avenue, Long Island City, has leased the four-story building at Nott and Vernon avenues, totaling about 40,000 sq. ft. of space, for the manufacture of woodenware specialties. Considerable machinery will be installed, in addition to the equipment now at the present works and which will be removed to the new plant. The company has an option to purchase the structure. L. J. Viehmann is head.

The Faspray Corporation, New York, has been incorporated in Delaware with a capital of \$200,000 by John D. Wholey, C. B. Kunliden and George E. Hite, Jr., Brooklyn, to manufacture washing, polishing and kindred machinery and parts. It is represented by the United States Corporation Co., 65 Cedar Street.

Charles E. Campbell, Inc., Elmhurst, L. I., has been incorporated with a capital of \$50,000 by Charles E. Campbell, K. K. Hillabrant and I. G. Wolf, Elmhurst, to manufacture rubber products. It is represented by Bauchler & Ganty, 51 Chambers Street, New York.

The United States High Speed Steel & Tool Corporation, 489 Fifth Avenue, New York, has filed notice of organization to operate with an active capital of \$2,600,000.

The Improved Metal Weather Strip Co., New York, has been chartered under State laws by L. Lipson and M. Rothenberg, 5 Beekman Street, to manufacture metal weather strips and kindred metal goods.

The Loop Lock Corporation, New York, has been incorporated with a capital of \$50,000 by T. Reanik, L. Herold and M. Schenkman, 56 Pine Street, to manufacture locks and other hardware products.

The American Engineer Factories, Inc., New York, has been incorporated under Delaware laws, with capital of \$500,000 to manufacture machinery and parts. It is represented by Samuel B. Howard, 65 Cedar Street.

Bear Tractors, Inc., New York, has been incorporated with a capital of \$500,000 by W. J. Greacen, P. Sawyer and E. Conway, 233 Broadway, to manufacture tractors and parts, automobile engines, etc.

Durant Motors, Inc., 1819 Broadway, New York, is organizing the Durant Motor Car Co. of Indiana to take over the plant of the Sheridan Motor Car Co., a division of the General Motors Corporation at Muncie, Ind. Possession will be taken early in August. The new company will be capitalized at \$3,000,000, and will use the works for the manufacture of a new six-cylinder automobile.

The Raven Screen Corporation, New York, has been chartered under State laws to manufacture metal screens and kindred metal goods. The incorporators are F. A. and A. L. Raven and E. O. Friedman. It is represented by A. P. Hawkins, 165 Broadway.

The Atlas Elevator Devices Corporation, Brooklyn, has been incorporated with a capital of \$100,000 by W. H. Dinspel, E. Weigle and E. R. Gippert, Brooklyn, to manufacture elevator equipment and other mechanical apparatus. It is represented by Pennie, Davis, Marvin & Edmonds, 165 Broadway.

The Brooklyn Edison Co., 360 Pearl Street, New York, has arranged for a bond issue of \$3,000,000 for extensions, improvements, general operations, etc. M. S. Sloan is president.

Mooney, Douglas & Pearson, Inc., New York, has been incorporated with a capital of \$100,000 to manufacture electrical equipment and hardware specialties. E. I. Cullen, 250 Ninety-third Street, Brooklyn, is the principal incorporator.

Fire, July 23, destroyed a portion of the machine shop and marine repair works of A. J. Wolcott & Son, Vernon Avenue, Long Island City, with loss estimated at about \$12,000. The adjoining plant of the Doncaster Planing Mill Co. was also partially destroyed, with loss of about \$25,000, including equipment.

The Titan Power Hammer Corporation, New York, has been incorporated under Delaware laws with capital of \$750,000 by J. P. Caylis, George Ayles and M. L. Savarese, Brooklyn, to manufacture power hammers and other heavy equipment. It is represented by the Capital Trust Co., Dover, Del.

The Bureau of Yards and Docks, Navy Department, Washington, has completed plans for a new power plant at Iona Island, N. Y., estimated to cost about \$27,000.

M. Thompson, 189 Montague Street, Brooklyn, has filed plans for the construction of a two-story automobile service and repair works, 112 x 200 ft., on Avenue A, between Sixtieth and Sixty-first streets, New York, to cost about \$135,000.

The Burroughs Adding Machine Co., 217 Broadway, New York, has leased about 17,500 sq. ft. of space in the building at 801-805 Broadway. A portion of the property will be used as an assembling department.

The Everhold Brake Appliance Co., Gloversville, N. Y., recently incorporated to manufacture brake equipment for automotive service, is planning for the erection of new works. Emanuel Zannetti is president and H. S. Cromwell, general manager.

The Comfort Safety Razor & Novelty Co., West Hoboken, N. J., has been chartered under State laws to manufacture safety razors and other cutlery. The incorporators are Vaclaz Abraham and Frederick Kulhawk, 588 Central Avenue.

The Tungsten Steel Mfg. Co., Boonton, N. J., has been chartered under State laws to manufacture tools, saws, knives and kindred products. The incorporators are Theodore L. Harrison, 198 Teaneck Road, Ridgefield Park, N. J.; Patrick M. Kelly, 343 Fairmount Avenue, Jersey City, N. J.; and William F. McDermott, 165 Broadway, New York. The company is represented by Parker W. Sweet, Boonton.

Fire, July 27, destroyed the saw mill at the plant of the Empire Steel & Iron Co., Oxford, N. J., with loss including power department, sawing machinery, engine, boilers, etc. The structure will be rebuilt.

The New Jersey Storage Battery Mfg. Co., Jersey City, N. J., has been chartered under State laws to manufacture storage batteries and other electrical equipment. The incorporators are Daniel E. Lenthe and Andrew J. Weger, 26 Tyson Place.

The State Highway Department, Trenton, N. J., has construction under way on a one-story building at Hammon-ton, N. J., 80 x 100 ft., to be equipped as an automobile service and repair works for county motor trucks and cars.

The Electro-Magnetic Wave-Bath Corporation, Newark,

N. J., has been chartered under State laws to manufacture electrical instruments and equipment. The incorporators are William S. Benson, Frank B. Schanne and James B. Reilly, 31 Clinton Street.

The General Sheet Metal Works, 150 Broome Street, Newark, has been organized to manufacture sheet metal goods and similar products. It is headed by Samuel Kinland, address noted.

The Safety Auto Lock Co., 31 Clinton Street, Newark, has filed notice of organization to manufacture locks and locking devices for automobiles. Warren J. MacCroy, 7 North Tenth Street, heads the company.

The Uglay Mfg. Co., 10 Johnson Avenue, Newark, N. J., has filed notice of organization to manufacture precision instruments and other equipment. Stephen Uglay, 128 South Seventh Street, heads the company.

R. Neumann & Co., Willow Avenue, Hoboken, N. J., have completed plans for the erection of a one-story power house, 40 x 100 ft., at their leather manufacturing plant.

New England

BOSTON, Aug. 1.

More machine-tools have been sold the past week than in many preceding weeks. Business, however, is largely confined to used equipment, quotations on which are so far below those on new tools as to attract buyers. Certain kinds of machines, however, such as used 20-in. upright drills, appear to be scarce.

Sales the past week include six No. 2 Consolidated, one Standard bench and 17 Standard foot presses, to a Boston concern. The Naumkeag Steam Cotton Co., Salem, Mass., bought a new 18-in. motor-driven engine lathe and a 3-ft. motor-driven radial drill, while the Yates Machine Co., Salem, metal specialties, purchased a used upright drill, shaper and a miscellaneous lot of small shop equipment. A Greater Boston rubber goods manufacturer closed on a new No. 1 B Milwaukee universal milling machine; a Boston concern a used Dreses radial drill; a South Boston manufacturer, two used bench presses, and a Fall River interest, a used Lincoln milling machine. The city of Boston took a new Le Blond cutter and reamer grinder for its normal art school, while Laconia, N. H., purchased a new No. 2 universal milling machine, two 13-in. and two 11-in. tool room lathes.

A Massachusetts manufacturer of valves bought two new Pratt & Whitney 16-in. lathes with complete equipment, while a Greater Boston firm covered on 9-ft., 5-ft. and 4-ft. used plate bending rolls, and a large punch and shear. An improved demand for cylindrical regrinding equipment from automobile interests is noted. One local house is about to close on an order for approximately \$25,000 worth of machine tools for one concern. David Beal & Co., Boston, report the sale to a Havana machine shop of an 8-ft. lathe, 6-ft. high-speed lathe, 20-in. back geared drill, and a 4-ft. planer, all used tools, as well as two indexing heads, miscellaneous new small tools and a large marine engine. This export business is the first in this market for some months.

The following companies are reported in the market for equipment: Warren D. Letchell, Dexter, Me., a used 18-in. x 10-ft. engine lathe, 20-in. upright drill, No. 2 Universal milling machine, small shaper, small planer and a wet tool grinder; city of Boston, a new No. 2 Universal milling machine with geared head and miscellaneous tools for schools; Weed Engineering Works, Bridgeport, Conn., used semi-automatic radial drill; American Bosch Magneto Corporation, Springfield, Mass., machine for grinding small cams; Federal Supply Co., Bridgeport, Conn., used pipe machine for cutting threads 4-in. to 10-in.; Boston Navy Yard, miscellaneous machine shop equipment.

Considerable interest is shown in the auction sale Aug. 4, by J. E. Conant & Co., Lowell, Mass., of approximately 100 machine tools at the plant of the Industrial Research Corporation, New Haven, Conn.

Activity among machine-tool builders is on a lower scale than at any time this year. The Pratt & Whitney Co., Hartford, Conn., machinery and small tool departments closed Aug. 1 for two weeks.

The Greenfield Tap & Die Corporation, Greenfield, Mass., has issued a new discount on taps and dies, showing a reduction in prices. The Norton Co., Worcester, Mass., has made a slight reduction in prices on bench grinders and floor stands. The Skinner Chuck Co., New Britain, Conn., has lowered quotations eight points on drill chucks. The market for Flynn micrometer boring heads is 5 per cent lower at 25 per cent discount. In common with companies making a similar line of goods, the Carborundum Co., Niagara Falls, has made a reduction in prices on Carborundum and Aloxete wheels.

The International Silver Co., Wallingford, Conn., has let a contract for an addition to factory L.

The Malden Electric Co., Malden, Mass., will erect an addition 68 x 70 ft., to its power station at Broadway and Oakland Avenue, Everett, Mass.

The Optical Abrasive Co., Southbridge, Mass., emery and other products used for lens grinding and polishing, has purchased property at Phillipsdale, Mass., which will be remodeled to meet its requirements. John J. Hogan, Jr., 60 Everett Street, Southbridge, and John E. Lowe, Coombs Street, are interested.

The Washington Mills, Lawrence, Mass., contemplates the erection of a new boiler shop within the next two months.

The R. P. Hazard Co., Gardner, Me., is planning the erection of a six-story and basement plant, 50 x 112 ft.

The Chandler Machine Co., Ayer, Mass., has awarded contract for a two-story plant, 60 x 120 ft.

F. A. Robinson will erect a boiler shop at the corner of Second and Binney streets, Cambridge, Mass. The New England Structural Steel Co., Inc., is the engineer.

The Sterling Roofing Co., New Bedford, Mass., has started the erection of a one-story plant, 75 x 150 ft.

The Apex Tire & Rubber Co., Providence, R. I., has been incorporated with a capital of 250 shares of stock, without par value, to manufacture automobile tires and other rubber products. The incorporators are John M. Franklin, Charles H. Sprague and David W. Smith, 104 Franklin Street.

Fire, July 28, destroyed the handle manufacturing plant of J. H. Tatem & Sons, Putnam, Conn., with loss estimated at about \$35,000, including equipment.

The Peerless Mfg. Co., Providence, R. I., manufacturer of machinery and precision equipment, has removed its works from 175 Potter Avenue to 268 Rugby Avenue, where increased facilities will be provided. Lewis A. Hagan is head of the company.

O. P. Thompson, 145 State Street, Springfield, Mass., has abandoned plans for the construction of a new eight-story automobile service and repair works on Dwight Street, estimated to cost about \$600,000.

George F. Spooner, Quincy, Mass., has filed plans for a new one-story machine shop on Cherry Avenue.

The City Council, Springfield, Mass., is planning for the erection of a new two-story automobile service and repair works for municipal trucks and cars on Summer Street, estimated to cost about \$75,000. F. H. Clark, city engineer, is in charge.

The David Brown Co., Lawrence, Mass., manufacturer of shuttles, bobbins and other textile machine equipment, has filed plans for its two-story addition, 40 x 100 ft., estimated to cost about \$40,000.

The Yankee Carbon Monoxide Burner Co., 9 Homer Street, Providence, R. I., has filed notice of organization to manufacture carbon burners, etc. James W. Craig, 1397 Broad Street, heads the company.

Chicago

CHICAGO, Aug. 1.

Distribution of the Illinois Central Railroad machine-tool orders was made last week, the total being close to \$150,000. The tools bought include a driving wheel lathe, car wheel lathe, boring mill, large planer, several engine lathes, a radial drill, bending rolls, shapers, 13 motor-driven grinding machines and some small upright drills, in all about 50 tools. It is admitted by sellers that, with the exception of two or three tools, prices were cut from 20 to 35 per cent. Orders were distributed among several sellers. Other contemplated railroad purchases by the Rock Island and Santa Fe railroads have been postponed, probably until fall.

Otherwise the local market continues dull, with few inquiries or sales. However, one dealer reports the sale last week of two machines from his floor stock, sales of this character having been very rare of late.

The G. A. Roth Mfg. Co., Hastings, Neb., has issued the following list:

- One turret lathe, 1½-in.
- One plain milling machine.
- One universal grinding machine.
- One screw machine.
- One multiple spindle drilling machine with two or three spindles.
- One geometric threading machine.
- One 16-in. engine lathe, 8-ft. bed.

The Ajax Forge Co., 2503 Blue Island Avenue, Chicago, has purchased one or two machines and is expected to buy the remainder on its recent list within a few weeks.

The Economy Machine Products Co., manufacturer of air brushes, 4755 London Avenue, Chicago, has let contract for

a one-story factory on Lawrence Avenue near Milwaukee Avenue at a cost of \$20,000. August Kopinski is president.

The Reedy Foundry Co., 4600 Iowa Street, Chicago, has increased its capital stock from \$75,000 to \$150,000 preparatory to engaging in the oil refining business. Its foundry equipment is being offered for sale.

The John M. Ryan Foundry Co., 506 Forty-first Street, Rock Island, Ill., announces the purchase of exclusive manufacturing rights of Ackerman metal for bearings for automobiles and tractors. A new company will be organized and the plans contemplate the construction of a manufacturing building.

G. E. Long, for many years president Ottawa Mfg. Co., Ottawa, Kan., manufacturer of oil engines, has sold his interest in that company and has purchased an interest in the Cherryvale Iron foundry, Cherryvale, Kan. He has also organized the Long Mfg. Co. to manufacture gasoline engines and wood saws.

The Illinois Steel Co. has taken out a building permit for the construction of a three-story brick and steel electric power station at its South Chicago works. The cost will be about \$250,000.

The Waterway Paper Co., Kedzie Avenue and Thirty-second Street, Chicago, is completing plans for the construction of a new one-story plant, 80 x 180 ft., with one-story power plant, 33 x 60 ft., estimated to cost \$175,000, with machinery. Frank D. Chase, Inc., 645 North Michigan Avenue, is architect and engineer.

The Badger Concrete Mixer Co., 221 Grand Avenue, Milwaukee, has completed plans and will soon break ground for the construction of the initial unit of its new plant at Winthrop Harbor, Ill., for the manufacture of concrete mixing machinery. It will be one-story, 80 x 260 ft., and is estimated to cost about \$60,000. E. McVicker is manager.

The Johnson Automotive Service Co. of America, 1201 Plymouth Building, Minneapolis, Minn., has preliminary plans under way for its three-story and basement automobile service and repair building, estimated to cost about \$90,000. Albert A. Johnson is president.

The Board of Water Trustees, Des Moines, Iowa, is completing plans for the construction of a new electrically operated pumping plant, to cost about \$150,000, with machinery. Alvord & Burdick, room 1418, 8 South Dearborn Street, Chicago, are engineers.

Philadelphia

PHILADELPHIA, Aug. 1.

The Board of Directors, Philadelphia General Hospital, Philadelphia, has filed plans for a new powerhouse, estimated to cost about \$20,000.

E. P. Alexander & Son, Inc., Philadelphia, has been incorporated with a capital of \$60,000 to manufacture mechanical belting. V. H. Alexander, 3417 Race Street, is treasurer.

The General Motors Products Co., Philadelphia, has been incorporated under Delaware laws, with capital of \$1,000,000, to manufacture automobiles and parts. F. R. Hansell, Land Title Building, represents the company.

The Keystone Automotive Corporation, Philadelphia, is being organized by Louis Kumpf, A. J. Shinn and Eugene L. Ellwanger to manufacture mechanical and electrical equipment for automobiles. It is represented by J. Rech Guckes, Real Estate Trust Building.

Hoisting and conveying equipment and other mechanical apparatus will be installed on the two new piers to be constructed by the Department of Wharves, Docks & Ferries, Philadelphia, Director Sproul in charge.

The Pennsylvania Power & Light Co., Allentown, Pa., has had plans prepared for the erection of a large central machine shop and repair works at its electric generating plant at Hauto, Pa. It will be built by the Phoenix Construction Co., an affiliated organization. Both companies are operated by the Electric Bond & Share Co., 71 Broadway, New York.

The Pharo Mfg. Co., Detroit, has removed its business to a plant recently acquired at Bethlehem, Pa., and will continue operations for the manufacture of automobile equipment. The plant at Detroit will be discontinued. R. P. Hutchinson is president.

The Lancaster Concrete Tile Co., Lancaster, Pa., has been incorporated with a capital of \$150,000 to manufacture concrete tile and kindred products. Edwin Rutter, Lancaster, is treasurer.

The Floyd-Wells Co., Royersford, Pa., manufacturer of stoves, ranges, heaters, etc., has taken bids for a two-story addition, 32 x 120 ft. A. S. Kepner, 121 Hanover Street, Pottstown, Pa., is architect. Russell Wells is head of the company.

F. A. Sieberling, Akron, Ohio, formerly head of the Goodyear Tire & Rubber Co., and associates, have acquired the plant and business of the New Castle Rubber Co., New Castle, Pa. The name of the company will be changed to the Lehigh Tire & Rubber Co. A number of improvements will be made and the plant placed in service at an early date. It is proposed to develop an initial output of 500 tires and 50 tubes per day.

The New Boston Coal Co., Hazleton, Pa., will electrify its local colliery, with service to be furnished by the Pennsylvania Power & Light Co. Motors, controlling devices and other equipment will be installed at once.

The plant of the Standard Process Steel Corporation, North Broad Street, Phillipsburg, N. J., has been sold by the liquidating committee to Col. W. P. Barba, Thirteenth and Cherry streets, Philadelphia, for about \$50,000. A company is being formed, represented by Colonel Barba, to take over the works and establish a plant for the manufacture of steel products. It is expected to begin operations at an early date.

The American Chemical Machinery Co., Philadelphia, has been incorporated under Delaware laws, with capital of \$500,000, to manufacture special machinery and parts. It is represented by the Corporation Guarantee & Trust Co., Land Title Building.

The Regal Spring Bed Co., Philadelphia, has been incorporated with a capital of \$30,000 to manufacture metal bedsteads, springs, etc. A. Charnofsky, 5742 Pine Street, is treasurer.

The Standard Carrier Co., Philadelphia, has been incorporated under Delaware laws with capital of \$100,000 by Samuel C. Adams, Joseph Smyth and Charles T. Rouss, Philadelphia, to manufacture metal frames and carriers. The company is represented by the Capital Trust Co., Dover, Del.

The Trenton Chilled Die & Casting Co., Trenton, N. J., recently organized, has established a plant at the foot of Houghton Avenue, for the manufacture of dies, castings and other mechanical products. John H. Conover is president and R. B. Newton, treasurer.

Reorganization plans are under way by Hare's Motors, Inc., Trenton, N. J., for the separation of its three manufacturing units and the dissolution of the parent organization. The plant and business of the Mercer Motor Co., Trenton, will revert to the control of those formerly in charge, with T. E. A. Barthel as vice-president and William A. Smith, general sales manager. Reorganization of the Locomobile Co. of America, Bridgeport, Conn., is now being arranged, as are the plans for similar action at the works of the Simplex Automobile Co., New Brunswick, N. J., another operating unit of the organization.

Plans for a new two-story ice-manufacturing plant, 80 x 80 ft., estimated to cost about \$75,000 with machinery, are being prepared by the Germania Brewery, 1808 Ninth Avenue, Altoona, Pa. Bids will soon be asked by Miller & Rider, 1510 Eighteenth Street, architects.

The Board of Public Grounds and Buildings, Harrisburg, Pa., is perfecting plans for the immediate rebuilding of the six industrial structures at the Western Penitentiary, recently destroyed by fire, with loss estimated at \$133,000, of which \$80,000 represents machinery and equipment. The Prison Board will advertise for bids for machine shop and other equipment at an early date.

The Allen Typewriter Co., Tenth and Turner streets, Allentown, Pa., has acquired the plant of the Allen Chemical Co., between Fourteenth and Fifteenth streets, for about \$26,000. It will be used by the new owner for the manufacture of typewriter parts and machinery will be installed at an early date. Assembling operations will be conducted as heretofore at the Tenth Street plant. James K. Bowen is head.

The State Highway Department, Harrisburg, Pa., has plans under way for a two-story machine and repair works and automobile service building at North and State streets, 100 x 200 ft., to be used for county motor trucks and automobiles. Samuel B. Rambo, deputy superintendent, will be in charge of the work.

Pittsburgh

PITTSBURGH, AUG. 1.

The demand for machinery and equipment in this market is still very limited. About the only encouraging feature is that when a purchase is made, shipping instructions are immediately given. It seems to be the tendency of buyers to delay replacements until the last minute, and to place orders only where assured of immediate delivery. The crane market is inactive, with as many inquiries being withdrawn as are coming out. The Wheeling Steel Corporation has yet to place three cranes for its new galvanizing

plant at Beech Bottom, W. Va. This inquiry calls for one 5-ton, 3-motor overhead of 71-ft. span, one 5-ton, 3-motor, overhead of 54-ft. span, and one 5-ton, 4-motor revolving jib crane. The city of Pittsburgh recently opened bids for ash-handling equipment, on which R. H. Beaumont & Co., Pittsburgh, were low bidders.

The American Laundry Machinery Co. has placed through the Pittsburgh office of the Northern Engineering Works, Detroit, an order for two 3-ton, 2-motor electric traveling cranes.

The Pittsburgh Screw & Bolt Co., Preble Avenue, Pittsburgh, Pa., manufacturer of bolts, rivets, nuts, etc., has filed plans for a one-story addition, estimated to cost about \$89,000.

The Tarentum Boiler Works, Inc., Tarentum, Pa., has been incorporated with a capital of \$75,000 by Frederick and L. A. Scharf and F. V. Cooper, Tarentum, to manufacture boilers, tanks and other plate products.

The Oberndorf Mfg. Co., 7509 Thomas Boulevard, Pittsburgh, manufacturer of pipe, steam fittings, etc., is taking bids for a one-story addition, 160 x 200 ft., estimated to cost about \$90,000. The W. G. Wilkens Co., Westinghouse Building, is architect. Edward Oberndorf is president.

The Brown Puncture-Proof Tube Co., Pittsburgh, has been chartered under State laws to manufacture automobile tubes and other rubber products. C. E. Johnson, 2112 Wightman Street, is treasurer.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, has taken an order for electrical equipment totaling \$1,200,000 from the Midi Railway, operating from Bordeaux to Certe, France. It will be used on the line from Pau to Toulouse, and consists of generating apparatus, substation machinery, etc.

The Point Spring Co., Pittsburgh, has been chartered under State laws to manufacture steel springs, iron products, etc. F. G. Darlington, Jr., Sewickley, Pa., is treasurer.

Roscoe-McGrath, Inc., Pittsburgh, has been incorporated under Delaware laws, with capital of \$50,000, to manufacture automobile parts and equipment. The incorporators are B. M. Roscoe, R. J. McGrath and A. M. Barron. The company is represented by the Corporation Trust Co., duPont Building, Wilmington, Del.

Machine-shop equipment and other mechanical apparatus will be installed in the new building now being erected at Liberty Avenue and Fancourt Street, Pittsburgh, for the Pittsburgh School of Auto Engineering. The structure will be eight stories, of reinforced concrete, and space not occupied by the Pittsburgh school at the present time will be used by the Liberty Battery Co. as a battery and electrical works.

The Huntington Coal Mining Co., 601½ Ninth Street, Huntington, W. Va., recently organized with a capital of \$600,000, has plans under way for the development of extensive properties at Ferguson, W. Va. The work will include the erection of three tipples and the installation of motors, cars and other mechanical equipment, estimated to cost about \$150,000. Bids for equipment will be asked late in August. Paul A. Boothe & Co., Huntington, W. Va., are engineers for the work. C. N. Morrison is president.

The Universal Building Supply Co., Huntington, W. Va., manufacturer of concrete blocks, etc., has plans under way for plant enlargements to double, approximately, the present capacity. The company was recently organized with a capital of \$50,000. H. H. Tetrick is head.

The Akka Cement Products Co., Inc., New Kensington, Pa., has been incorporated under Delaware laws to manufacture concrete and cement products. The incorporators are James L. Thompson, Harry A. Rawlinson and Malcolm Stepp, New Kensington. The company is represented by the Capital Trust Co., Dover, Del.

Detroit

DETROIT, AUG. 1.

A group of Detroit men have organized the Rickenbacker Motor Co., with a capitalization of \$5,000,000, to manufacture a popular-priced car. B. F. Everitt, at one time connected with the former E-M-F Co., which later became a part of the Studebaker Corporation, will be president and general manager; Capt. Rickenbacker, vice-president and sales manager, and Harry L. Cunningham, secretary-treasurer. Walter E. Flanders, also formerly connected with the E-M-F Co., will head the board of directors. Other directors include Carl Tichnor, Roy Hood and E. R. Evans. Mr. Hood will be purchasing agent. Application for a State charter has been made and negotiations are under way for a factory in Detroit.

The Stokes Mfg. Co., Owosso, Mich., care of the local

Chamber of Commerce, has awarded contract to Malisky & Sons, First Street, for the construction of its new plant for the manufacture of automobile parts and other mechanical equipment. It will be one-story and basement, 50 x 100 ft., estimated to cost about \$14,000, exclusive of equipment.

The Peterson Spring Co., Detroit, has been chartered under State laws, to manufacture metal springs, and other wire and steel products. August Peterson, 4762 Townsend Avenue, Detroit, heads the company.

The Peninsula Paper Can Co., Detroit, has preliminary plans under way for the construction of a new plant at Monroe, Mich., for the manufacture of paper containers, cans, etc. The company is being organized with a capital of \$500,000, and is headed by R. P. Adams, sales manager of the Detroit Heating & Lighting Co., Detroit.

Officials of the Bissell Carpet Sweeper Co., Grand Rapids, Mich., have organized the Grand Rapids Sweeper Co., to manufacture carpet sweepers and parts, to be operated as an affiliated interest. It is headed by Melville and A. Bissell, 112 College Avenue, S. E.; and C. E. Shanahan.

The Transue-Williams Steel Forge Corporation, Alliance, Ohio, is completing plans for its proposed new plant at Marysville, Mich., and, it is said, will call for bids at an early date. The new works are estimated to cost about \$45,000.

The Photo-Electric Bean Grader Co., Ithaca, Mich., has been incorporated with a capital of \$150,000 by D. J. Lynch, Ray F. McWilliams, and Henry McCormack, Ithaca, to manufacture grading machinery for agricultural and other service.

Buffalo

BUFFALO, Aug. 1.

The South Buffalo Terminals, Inc., Buffalo, has made application to the City Council to erect a new one-story factory terminal building, 90 x 100 ft., at 310 South Park Avenue, to be equipped with freight handling and conveying machinery, etc. E. C. Randall is president.

The La Falce Safety Turn Motor Lock, Inc., Buffalo, has been incorporated in Delaware with a capital of \$50,000 by Palmerino La Falce, Melmoth D. Martin and Edward E. Nelson, Buffalo, to manufacture automatic locks and locking devices. It is represented by Woodburn Martin, Georgetown, Del.

The Iroquois Utilities, Inc., City Bank Building, Syracuse, N. Y., has plans under way for a new electric power plant at Concord, Erie County.

The National Windshield Co., Buffalo, has been incorporated with a capital of \$25,000 by W. B. and R. R. Frear and C. Harris, Buffalo, to manufacture windshields and other automobile specialties. It is represented by Botsford, Lytle, Mitchell & Albro, Fidelity Building.

The Stanard-Snyder Co., Syracuse, N. Y., has been chartered under State laws to manufacture automobile equipment. The incorporators are C. H. Stanard, G. Snyder and T. H. Dohm, Syracuse. It is represented by Gannon, Spencer & Mitchell, O. C. S. B. Building.

The Common Council, Old Forge, N. Y., is perfecting plans for the erection of its new municipal electric power plant. H. C. Weller, Old Forge, is engineer. Walter D. Marks is president of the council.

Baltimore

BALTIMORE, Aug. 1.

The Hancock Steel Co., Martinsburg, W. Va., is completing preliminary plans for the erection of the initial unit of its new plant at Hancock, Md., one story, 130 x 200 ft., to be equipped as a foundry and machine shop. It is estimated to cost in excess of \$100,000. Ernest McGeorge, 1900 Euclid Building, Cleveland, is engineer. F. Vernon Aken heads the company.

The Union Shipbuilding Co., Fairfield, Baltimore, is planning for enlargements in its plant to cost about \$350,000. The work, for the most part, will consist of additional construction and repair buildings and equipment, including a marine railroad line.

The Floatless Carburetor Co., 916 Munsey Building, Baltimore, has been incorporated with a capital of \$100,000 by Claude R. Hays, F. Strattner Orem and R. Contee Rose to manufacture carburetors and similar equipment for automotive service.

The Planters' Mfg. Co., Port Norfolk, Va., is planning to rebuild its barrel and crate manufacturing plant, recently destroyed by fire, with loss estimated at about \$200,000, including machinery.

The Universal Ice Machine Co., Wilmington, Del., has been incorporated with a capital of \$1,200,000 by William

T. Morris, Edward W. Couch and Leonard E. Wales, Equitable Building, to manufacture ice and refrigerating machinery.

The Enterprise Foundry Co., Bristol, Va., will remodel the local plant formerly owned by the Virginia Iron, Coal and Coke Co., which it recently acquired. The work is estimated to cost close to \$50,000.

The Hickory Power Co., Hickory, N. C., has been incorporated with a capital of \$200,000 to equip and operate an electric light and power plant. The incorporators are B. M. Spratt, L. F. Abermathy and J. A. Moretz, all of Hickory.

The Monarch Tractors, Inc., Wilmington, Del., has been incorporated under State laws, with capital of \$1,000,000, to manufacture tractors, parts and other automotive equipment. It is represented by the Corporation Trust Co., du Pont Building.

The Superior Anthracite Coal Corporation, American National Bank Building, Roanoke, Va. recently organized with a capital of \$200,000, is planning for the installation of new hoisting machinery and other mechanical equipment at its properties at McCoy, Va. Clyde E. Smith is president and general manager and R. L. Keger, secretary and treasurer.

The Carolina Metal Culvert Co., Salisbury, N. C., recently incorporated, will operate a plant for the manufacture of metal culverts, with size ranging from 12 to 50-in. Leo C. Wallace is president and Ernest L. Hardin, secretary and general manager. The company is capitalized at \$200,000.

Ohio

A somewhat better feeling has developed in the Cleveland machinery market and manufacturers and dealers seem more hopeful regarding the outlook for orders. Inquiries have improved slightly but the volume of business placed the past week shows little change, with but very few orders except for single tools. July business on the whole was probably as light as during June, and one manufacturer states that his July sales were less than any previous month this year. The largest order reported was for five or six used machines placed by the Reynolds Spring Co., Jackson, Mich.

Interest during the week centered on an inquiry for 25 machines for the McKinley school, Canton, for which bids were received July 29. This business resulted in keen competition and brought out some low prices. It had been the practice of the trade to allow a discount of 5 per cent on machines sold to schools, but on this inquiry discounts as high as 20 per cent were quoted on some tools. The Big Four Railroad the past week asked for quotations on a boring mill, which is supplementary to machines for which it had previously sent out inquiries. Dealers have no information as to when this business will be placed.

Manufacturers report an improvement in inquiries for electric motors and generators in small units. Preliminary inquiries have come out for 5 or 6 hydroelectric installations ranging from 100,000 to 300,000-hp. The city of Nashville has taken bids for a 20-ton electric traveling crane.

In Cincinnati some scattered inquiries are being received but orders are still running very light. A few more machine-tool plants which had been running on short time, closed July 30 for an indefinite period. Some of the larger shops are still operating, however, and expect to continue for several weeks at least. Local dealers report the market very quiet both for new and old tools. A better tone is evidenced, however, and improvement is looked for with the coming of cooler weather. No lists have made their appearance and while a few purchases have been made on some of those now out, the bulk of the business still remains to be placed.

The Edwards Mfg. Co., Cincinnati, sheet metal manufacturer, has purchased property adjacent to its plant on Eggleston Avenue, and is contemplating additions. Preliminary plans are under way for extensions aggregating over \$1,000,000. E. W. Edwards, is president.

The Great Western Lathe & Tool Co., Cincinnati, has been incorporated with a capitalization of \$25,000 to manufacture precision and bench lathes. Definite arrangements regarding the location for a plant will probably be announced within the next week. Henry Aeberle, 128 Opera Place, is one of the prime movers in the organization of the company.

G. P. Young, formerly associated with the Hadfield-Penfield Steel Co. and A. W. Wheeler, previously with the Allen Motor Co., will open a machine shop in Bucyrus, Ohio, in a portion of the plant formerly occupied by the Bucyrus Machine Tool Co., and will engage in general repair work.

The London Motor Plow Co., London, Ohio, manufacturer of tractor plows, has been incorporated with a capital stock of \$50,000. E. H. Daniels is president and general manager; P. J. Kirwin, first vice-president; H. Emerick, second vice-president; R. Dunham, secretary, and H. Pimell, treasurer.

The Apex Spring Cover Co., 6508 St. Clair Avenue, Cleveland, has placed a contract for a one-story factory, 30 x 38 ft.

The Wellman-Seaver-Morgan Co., Cleveland, has taken an order for a 325-hp. hydraulic turbine with 200 ft. head and operating at 900 r.p.m. for the city of Cookeville, Tenn.

The Heltzel Steel Form & Iron Co., Warren, Ohio, recently placed an order with Bertsch & Co., Cambridge City, Ind., for one 1/2-in. x 144-in. squaring and splitting shear.

Indiana

INDIANAPOLIS, Aug. 1.

The Knox & Sullivan County Light & Power Co., Carlisle, Ind., has been incorporated with a capital of \$75,000 to operate a local electric light and power plant. It is headed by Murray Owen, J. D. Boswell and N. S. McGillivray, all of Carlisle.

The Frankfort Ice & Coal Co., Frankfort, Ind., has awarded a contract to John Paden, Frankfort for rebuilding the portion of its ice manufacturing plant at 300-306 West Ohio Street, recently damaged by fire. It will be one-story, and is estimated to cost about \$60,000.

The United States Gravitation Mail Post Co., Sullivan, Ind., has been incorporated under State laws to manufacture metal mail chutes and kindred products. It is headed by Jacob Nicholson, Thomas Bickel and Solon Shepherd, all of Sullivan.

The Board of Directors, St. Elizabeth Hospital, Lafayette, Ind., will soon break ground for a new power house in connection with the erection of a hospital extension at the institution, estimated to cost about \$150,000. D. X. Murphy, Louisville Trust Building, Louisville, is architect.

The Shrader Battery Co., New Albany, Ind., has been chartered under State laws to manufacture electric storage batteries and affiliated equipment. The incorporators are Daniel and W. A. Shrader and Julius Maier, New Albany.

The Common Council, Linton, Ind., has commissioned Shrouds, Stone & McCormick, 510 Tribune Building, Terre Haute, Ind., architects and engineers, to prepare plans for the new municipal electric light and power plant, one-story, 75 x 95 ft.

Milwaukee

MILWAUKEE, Aug. 1.

A small volume of orders for new machine tools is coming from scattered sources, making a fair aggregate in view of the restricted business recently placed. Business in July showed a small percentage of increase over June, which was the duller month this year. The automotive industries have again become a principal factor, although so far their needs have been limited. Orders consist largely of single tools, which are wanted for immediate shipment.

The General Industrial X-ray Co., Milwaukee, a new corporation with \$100,000 capital, on Aug. 1 began manufacturing operations at 246 West Water Street, in a two-story addition to the factory and warehouse of the E. H. Karrer Co., manufacturer of surgical instruments and appliances. Officers of the new company are: President, E. H. Karrer; secretary, William Guillaume; treasurer, Otto Herrmann.

The Board of Education, Durand, Wis., is taking bids until Aug. 30 for the erection and equipment of a junior high and vocational training school the cost not to exceed \$100,000. The architects are Oppenhamer & Obel, Wausau, Wis. H. A. Miles is secretary of the board.

The Standard Steel Corporation, 1251 Thirtieth Street, Milwaukee, has increased its capitalization from \$300,000 to \$750,000, consisting of \$600,000 of common and \$150,000 of preferred shares. It manufactures steel barn, stable and toilet equipment and recently completed a new plant.

The Industrial Heating & Engineering Co., 143 Oneida Street, Milwaukee, has incorporated with a capital stock of \$75,000, consisting of \$40,000 common and \$35,000 of preferred shares. The incorporators are A. F. Bowers, H. S. Bowers and E. W. Spencer, attorney.

The Lux Typewriter Co., Luxemburg, Wis., has been organized with an initial capitalization of \$20,000 to manufacture writing machines and similar devices. The incorporators are Anton C. Svoboda, Joseph M. Ramesh and Louis A. Karel.

The Marathon Rubber Products Co., Wausau, Wis., has awarded contracts for a one-story brick and steel factory, 60 x 120 ft., to the Wisconsin Engineering & Construction Co., local, which sublet the steel work to the Worden-Allen Co., Milwaukee. It will purchase equipment and motors.

The Wisconsin Battery & Ignition Co., Green Bay, Wis., has been incorporated with a capital stock of \$25,000 and will establish a shop for manufacturing and repairing storage batteries and electrical equipment for passenger and

commercial automobiles. The incorporators are Ernest J. and Anton J. Balza and Ralph R. Ramey, all of Green Bay.

The General Motors Corporation, Detroit, has completed the transfer of its Samson motor truck manufacturing operation from Flint, Mich., to the main works of the Samson Tractor Co., Janesville, Wis., where production was resumed Aug. 1. For the present the principal parts will be manufactured at Flint and shipped to Janesville for assembling.

The Peerless Electric Co., 2028 Fond du Lac Avenue, Milwaukee, will award contracts Aug. 6 or 8 for a brick and concrete machine and repair shop building, 45 x 120 ft., at Eighteenth Street and North Avenue.

The Soloun-Stuchlek Specialty Co., Milwaukee, has been incorporated with a capital stock of \$80,000 to manufacture machinery, machines, devices, implements, etc. The incorporators are Martin V. Soloun, John M. Stuchlek and Arthur A. Glanz, 820 Tenth Street, Milwaukee.

The Central South

ST. LOUIS, Aug. 1.

The Grandfield Refining Co., Kansas City, Mo., has plans under way for the construction of a new refinery at Little Rock, Ark., to cost about \$250,000, including machinery.

The Southern Refrigeration Co., Johnson City, Tenn., recently organized with a capital of \$400,000, has plans under way for a new ice manufacturing and cold storage plant, estimated to cost in excess of \$100,000.

The Board of Directors, University of Missouri, Columbia, Mo., L. Cowan, secretary, is completing plans for a new one-story and basement power plant to cost about \$150,000.

The H. F. Wilcox Oil & Gas Co., Bristow, Okla., is planning for the construction of a new refinery, with initial daily output of about 500 bbl. H. F. Wilcox is head.

Mechanical equipment and machinery, including hoisting apparatus, conveyors, and general mining machinery to cost about \$300,000, will be installed by the Central Coal & Lumber Co., Vinia, Okla., at its properties. The company is a subsidiary of the Central Coal & Coke Co., Kansas City, Mo.

The Ricberger Light & Specialty Co., 126 South Second Street, Memphis, Tenn., is planning for the organization of a subsidiary company to establish a plant for the manufacture of kerosene oil burners and burner parts.

The Commercial Coal Mining Co., Lexington, Ky., recently organized, is planning for the installation of mechanical and electrical equipment at its properties. J. H. Hall heads the company.

The City Council, Osborne, Kan., will break ground at once for its proposed one-story municipal electric light and power plant, estimated to cost about \$75,000. E. T. Archer & Co., 609 New England Building, Kansas City, Mo., are architects.

The Gulf States

BIRMINGHAM, Aug. 1.

The Jaffe Iron & Metal Co., Birmingham, Ala., has plans under way for the erection of a new building at its works to replace a structure recently destroyed by fire, with loss reported in excess of \$100,000, including equipment.

The American Motors Export Co., Jacksonville, Fla., has awarded a contract to the O. P. Woodcock Co., Jacksonville, for the initial unit of its new plant for the manufacture of automobiles and parts. It is estimated to cost about \$150,000 with equipment. The company recently acquired a large tract of land for the new works. Henry L. Innes is president.

The City Council, Webster, Fla., will call for bids this month for the construction of a new municipal electric light and power plant. A bond issue to cover the work recently has been sold.

The Monroe Oil & Refining Corporation, Fort Worth, Tex., recently incorporated with a capital of \$1,000,000, has preliminary plans under way for the construction of a new refinery, estimated to cost about \$500,000. The company is headed by V. S. Monroe, Fort Worth, and R. W. Perry, Polytechnic, Tex.

The Navajo Sanatorium Co., Sarasota, Fla., recently organized, has plans in preparation for a plant to manufacture surgical instruments. Dr. Y. Nabona is treasurer and general manager.

A hydroelectric power plant will be constructed by the Planters & Merchants Mill Co., Austin, Tex., in connection with a new cotton mill at New Braunfels, Tex. The company is now being organized with a capital of \$1,000,000. Lockwood, Greene & Co., 101 Park Avenue,

New York, and Boston, Mass., architects and engineers, will prepare plans for the project. S. M. Ransopher, director of industrial education, University of Texas, Austin, heads the new company.

The Hercules Brick Co., Dallas, Tex., has preliminary plans under way for new works with a daily output of about 150,000 brick. It has acquired about 16 acres on the Trinity River, and the new plant is estimated to cost about \$75,000, with equipment. A. B. Salam is general manager.

The Burnwell Coal Mining Co., Burnwell, Ala., is planning for the installation of electrically operated hoisting and haulage equipment at its properties.

The Nu-Tex Brick Co., Tampa, Fla., has completed plans for a new works with a daily capacity of about 30,000 bricks. Erection will begin at once.

California

SAN FRANCISCO, July 27.

After the little activity in the machinery market, business again has become quiet. Inquiry for new machine tools has been very light, with a few scattering sales of small types. The second-hand market is moderately active, and is attracting most of the buyers.

The Richardson Welding & Mfg. Co., Oakland, Cal., has arranged for the removal of its plant to the buildings recently occupied by the Pacific Coast Shipbuilding Co., lately acquired. The new works will be developed for considerable increase in production.

The Pacific Machine Shop, 112 East Seventeenth Street, Los Angeles, has filed notice of organization to operate a machine and repair works. Charles H. Husk, 1424 Vermont Avenue, heads the company.

The Western Automatic Sprinkler Co., Los Angeles, has been incorporated with a capital of \$25,000 by Charles E. Felt, S. F. Martin, and C. L. Chandler, 434 Investment Building, to manufacture sprinkler devices, spraying systems, etc.

The California Car Co., 496 Twelfth Street, Oakland, Cal., manufacturer of automobiles and automotive equipment, has plans under way for a new one-story plant. C. R. Manbert, address noted, is architect.

The Republic Steel Package Co., 7930 Jones Road, Cleveland, has commissioned L. F. Hyde, architect, Oakland, Cal., to prepare plans for its proposed Pacific Coast plant, to be one-story, 60 x 300 ft.

The Belcher Aerial Mfg. Co., Los Angeles, has been incorporated with a capital of \$200,000 by O. T. Belcher, F. P. Snow, and C. F. Holland, 1022 Citizens National Bank Building, to manufacture aircraft, motors, and parts.

The Sierra Oil & Refining Co., Oxnard, Cal., is considering plans for the construction of a new refinery. It is proposed to break ground at an early date.

The Miller Auto Electric Mfg. Co., Los Angeles, has been incorporated with a capital of \$100,000 by Robert C. Camp, J. F. Nelson, and L. T. Mayhew, 338 Byrne Building, to manufacture electrical equipment for automotive service.

Canada

TORONTO, Aug. 1.

Only a small demand exists for machine tools in this market. Inquiries have been coming in larger numbers, but have in no way stimulated the demand for equipment, which is principally for single tools. Canadian railroads have made no move to enter the market and until makers of railroad equipment are in a position to resume operations dealers do not look for much buying from this source. The plant of the Canadian Car & Foundry Co., has started work on the construction of tank cars for the Russian Government and it is expected that this order will keep the works operating at capacity for three or four months. The demand for small tools is very light and wood-working equipment is also quiet. No change in prices has been announced this week, although a reduction of 10 per cent was made last week on twist stock carbon and wood-boring drills, the new discount being 42½ per cent.

Peters, 43 Yonge Street, Toronto, are in the market for an 18 to 24-in. gap lathe, drill, keyway machine, emery stand and buffer.

The Lorne Tractors, Ltd., will establish a plant at Chatham, Ont. A site has been secured in the west end of the city and the company proposes to start building operations within a month. It will specialize in the manufacture of gasoline tractors for farm work.

The Vancouver Rolling Mills Co., Eburne, B. C., is in

the market for the following equipment, new or used, if in good condition: A 16 or 18-in. two stand mill with roughing and flat finishing rolls; scrap alligator shears, 30-in. blade, capable of cutting up to 5 or 6-in. cold square steel, prefer style No. 5 or 6 United Engineering or equal, must have steel head.

The Administrative Commission, Montreal, will receive bids until Aug. 20, for the construction of an electric pumping station to cost \$500,000. Plans are with A. E. Doucet, engineer.

The City Council, Toronto, Ont., plans harbor drainage work to cost \$691,000, including the construction of a pump house, pumping equipment, etc. T. L. Church is chairman of the Board of Control.

The Oro Cement Products, Ltd., Barrie, Ont., recently organized with a capital stock of \$40,000, has secured a building which it will equip for the manufacture of brick and cement products, etc.

The lumber mill owned by Gilroy McKay, Port Alberni, B. C., was destroyed by fire with a loss of \$75,000. It will be rebuilt and new equipment purchased.

The Great West Farm Machines, Ltd., Milverton, Ont., has been incorporated with a capital stock of \$300,000 by Henry C. Mohr, John Boshart, Enos Nafziger and others to manufacture farm implements, tools, etc.

Trade and Office Changes

The grinding and polishing stand and accessory department of the Webster & Perks Tool Co., manufacturer of machine tools, Springfield, Ohio, has been sold to the Hill-Curtis Co., Kalamazoo, Mich., the latter company having acquired all drawings, patterns, jigs and tools, raw and finished materials, finished machines, engineering, production and sales records and data. The Hill-Curtis Co. is an old concern operating a foundry, forge and machine shop, etc. The Webster & Perks Company will devote all attention to the manufacture and sale of universal and plain cylindrical grinding machinery.

The partnership of Cann & Saul, 516 Commerce Street, Philadelphia, has been consolidated with the Cann & Saul Steel Co., Inc., with works at Royersford, Pa., and hereafter will trade under the name of Cann & Saul Steel Co., Inc., maintaining the Philadelphia office. The officers are: David S. Cann, president and general manager; George E. Saul, treasurer; Henry D. Rutter, secretary and sales manager.

The Allied Machinery Co. of America, 51 Chambers Street, New York, has been appointed foreign representative in all countries, except the United States and Canada, for the Universal Crane Co., Cleveland.

The Iron Trade Products Co., Farmers Bank Building, Pittsburgh, has been appointed exclusive sales agent for the Donley mine, shipping station of which is Johnetta, Pa., Allegheny Valley Railroad. Operation has an output of five cars of coal a day.

The Continental Can Co., Inc., New York, has removed to its new plant, Sixteenth and Coles streets, Jersey City, N. J. The Eastern general line sales office, formerly at 616 West Forty-third Street, New York, is now located at the above address, phone, Montgomery 4701.

The Cochrane Steam Specialty Co. of Massachusetts has been organized to represent in New England a number of well-known manufacturers of power plant equipment, including the H.S.B.W.—Cochrane Corporation, manufacturer of feed water heaters, steam and oil separators, V-notch meters and metering heaters, hot and cold process water softeners, flow meters, precision meters, weighing meters, multiport valves and multiport drainers; also the Steam Motors Co., Inc., manufacturer of steam turbines for driving generators, pumps, fans, etc., and the D. Connelly Boiler Co., builder of water tube steam boilers. The office is in charge of Elliott Green, who has long been connected with the several lines mentioned, and is located at 1045 Oliver Building, Boston.

M. M. Wyckoff, formerly engineer, construction superintendent and general purchasing agent for T. A. Gillespie Co., announces the formation of the Wyckoff Engineering Corporation for the general practice of engineering, contracting, building; purchasing, sales and efficiency engineering; reports, appraisals and investigations. Offices are at 233 Broadway, Woolworth Building, New York.

Clarence H. Landsittel has been appointed sales engineer for the Climax Motor Devices at Chagrin Falls, Ohio (near Cleveland). For several years the Climax company has manufactured a complete line of magnet and generator couplings and is now ready to put on the market a single cord disk universal. Mr. Landsittel served as purchasing agent for the Templar Motors for three years and prior to that in the same capacity for the Haynes at Kokomo.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.78c.
Swedish bars, base price.....	12.00c.
Soft steel bars, base price.....	2.78c.
Hoops, base price.....	3.88c.
Bands, base price.....	3.43c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.88c.
Channels, angles and tees under 3 in. x	
¼ in., base.....	2.78c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger.....	2.75c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.95c.
Toe calk, ½ x ¾ in. and larger.....	3.45c.
Cold-rolled strip, soft and quarter hard.....	10.00c. to 10.50c.
Open-hearth spring steel.....	4.25c. to 8.00c.
Shafting and Screw Stock:	
Rounds.....	4.38c. to 4.53c.
Squares, flats and hex.....	4.98c. to 5.03c.
Standard cast steel, base price.....	14.00c.
Extra cast steel.....	17.00c.
Special cast steel.....	22.00c.

Tank Plates—Steel

¼ in. and heavier.....	2.88c.
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Sheets

Blue Annealed

	Per Lb.
No. 10.....	3.53c. to 3.68c.
No. 12.....	3.58c. to 3.73c.
No. 14.....	3.63c. to 3.78c.
No. 16.....	3.73c. to 3.88c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20.....	4.05c. to 4.30c.	.....
Nos. 22 and 24.....	4.10c. to 4.35c.	4.70c.
No. 26.....	4.15c. to 4.40c.	4.75c.
No. 28.....	4.25c. to 4.50c.	4.85c.
No. 30.....	4.50c. to 4.75c.	.....

No. 28, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14.....	4.25c.
No. 16.....	4.50c.
Nos. 18 and 20.....	4.65c.
Nos. 22 and 24.....	4.80c.
No. 26.....	4.95c.
No. 27.....	5.10c.
No. 28.....	5.25c.
No. 30.....	5.75c.

No. 28, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel			Wrought Iron		
	Blk.	Galv.		Blk.	Galv.
½ in. Butt..	—48	—32	¾ in. Butt....	—22	—4
¾ in. Butt..	—54	—39	1-1½ in. Butt.	—24	—6
1-3 in. Butt..	—56	—42	2 in. Lap.....	—14	—1
3½-6 in. Lap.	—51	—37	2½-6 in. Lap.	—22	—6
7-12 in. Lap..	—43	—27	7-12 in. Lap...	—7	+4

Steel Wire

	Per Lb.
Bright basic.....	4.25c. to 4.50c.
Annealed soft.....	4.25c. to 4.50c.
Galvanized annealed.....	5.00c. to 5.25c.
Coppered basic.....	4.75c. to 5.00c.
Tinned soft Bessemer.....	6.25c. to 6.50c.

*Regular extras for lighter gages.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Metal Markets."

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet.....	15¼c. to 18¼c.
High brass wire.....	16¼c. to 21¼c.
Brass rod.....	13¼c. to 20¼c.
Brass tube, brazed.....	27 c. to 31 c.
Brass tube, seamless.....	19 c. to 20 c.
Copper tube, seamless.....	22¼c. to 23 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21¼c. to 23¼c. per lb. base.
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade	Grade	Coke—14x20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC..	\$10.60	\$9.50	80 lb....	\$6.80	\$6.55
IX..	11.80	10.75	90 lb....	6.90	6.65
IXX..	13.60	12.25	100 lb....	7.00	6.75
IXXX..	15.60	14.25	IC...	7.20	6.95
IXXXX..	17.20	16.00	IX...	8.10	7.85
			IXX...	9.10	8.85
			IXXX...	10.50	10.25
			IXXXX...	11.50	11.25

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.50
IC	7.75
IX	8.00
Fire door stock	11.00

Tin

Straits pig	30c.
Bar	37c. to 38c.

Copper

Lake ingot	16c.
Electrolytic	16c.
Casting	16c.

Spelter and Sheet Zinc

Western spelter	6¼c. to 6½c.
Sheet zinc, No. 9 base, casks	11½c. open 12c.

Lead and Solder*

American pig lead	5¼c.
Bar lead	6¼c. to 6½c.
Solder, ½ and ½ guaranteed.....	20¼c.
No. 1 solder	18¼c.
Refined solder	15¼c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.....	80c.
Commercial grade, per lb.....	40c.
Grade D, per lb.....	35c.

Antimony

Asiatic	6½c. to 7c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb....	30c. to 32c.
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Old Metals

Values are a little lower in sympathy with the new copper market. Dealers' buying prices are as follows:

	Cents
	Per Lb.
Copper, heavy and crucible	9.75
Copper, heavy and wire	9.00
Copper, light and bottoms.....	7.75
Brass, heavy	4.50
Brass, light	3.75
Heavy machine composition.....	8.00
No. 1 yellow brass turnings	4.00
No. 1 red brass or composition turnings.....	6.50
Lead, heavy	3.50
Lead, tea	2.25
Zinc	2.50

